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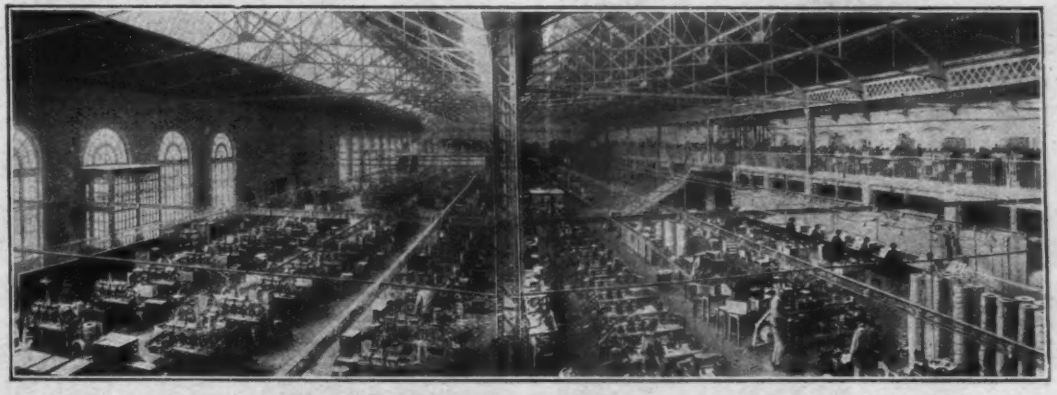

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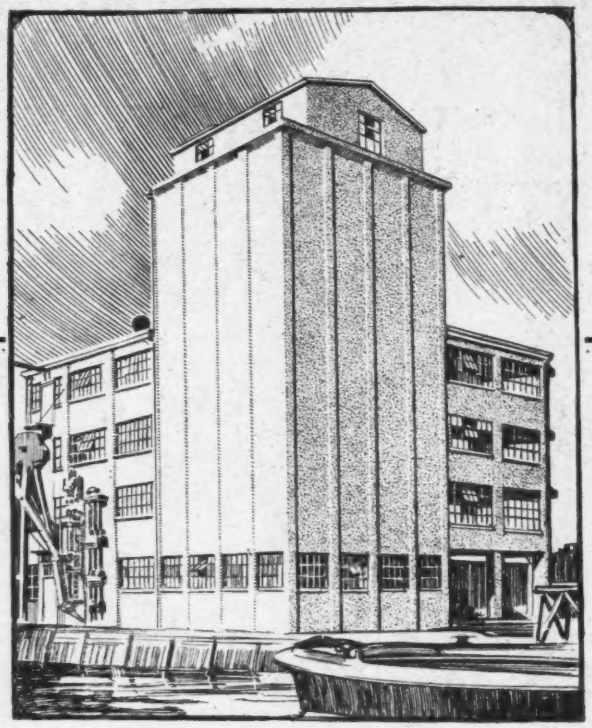

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Vol. II., No. 6 | The editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings whenever possible. | April, 1928

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Stomach Capacity.

THE DIRECTOR of Food Research at Stanford University, Dr. Carl Alsberg, was asked by the National Canners' Association to report on the desirability and the way and means of undertaking a research into the distribution and consumption of canned goods. Dr. Alsberg has given his reply in the form of a report; this report begins by stating that an investigation of the kind suggested would be extremely valuable to the canning industry, for several reasons.

The distribution problems of the canner are quite different from those of every other manufacturer outside the food industry; they are also more complex. The problem is to get the consumer to eat canned foods rather than something else, not how to make him eat more food. Apparently this is based on a simple law of physiology, which is stated to run: "Men's stomachs will not stretch; we cannot fill our bellies more than full." Now follow the chain of reasoning: if we attempt to break this law, we get fat; if we get fat, we become unfashionable. But most people would rather be dead than be out of the fashion, therefore the consumption of food is not limited by our purchasing power, but by the physiological law that adjusts our appetites to our needs. There are, of course, other ways of arriving at the same conclusion.

More about the Stomach.

Ross McIntyre, ex-President of the National Chain Store Grocers' Association, approached, in a rather artless and shrewd way, from a different angle. "The filling of this three-quarts container with the proper material at a cost commensurate with the earnings of the owner of the stomach is the business we are discussing at this assembly—of course, at a profit to all concerned. Inasmuch as our source of profit is dependent upon the length of time the owner of this stomach continues to use it successfully, we should be very careful of the materials used. Of course, the owner, being also particular about that point, is inclined to co-operate with us very generously in the matter. If we are manufacturers of food material, knowing the advantage of maintaining the long life of the human being, we should see to it that the quality is such as will not ever, in any way, tend to shorten this life or injure in the slightest this important member of the body, the stomach."

There is much horse sense in these remarks, when one comes to ponder over them!

Distribution Problems.

But to return to Dr. Alsberg's report. The point he has made clear is that the consuming power of an individual is limited, not by his purchasing power,

but by his storage capacity. This is not the case with other products; you can get people to buy motor-cars, silk stockings, boots, gramophone records, dogs, quack medicines, socks, or town lots in a swamp, in quantities which depend upon their purchasing power and upon the persuasiveness of the salesman. If you sell someone a motor-car, you do not block the sale of a radio or a pair of shoes. On the other hand, if you sell him one kind of food, you automatically reduce the quantity of other kinds he will buy. You are not only competing with every other commodity for your share of the consumer's income, but you are competing also with every other kind of foodstuff. In a word, you cannot increase the consumption of canned foods (or any other kind of food) without at the same time reducing the consumption of some other kinds of food; therefore, your distribution problems are your own, and you must get the information yourself.

Information Required.

The kind of information required—and this applies, of course, not only to canned goods alone—may be indicated by some examples. Thus, what consumption of the article may be considered as a normal? Knowing this, we should have a standard of reference. Again, one should know whether any given locality is taking the normal amount or not. One should also know the actual consumption by race, religion, income, occupation and social habits; all these, and other factors, determine the demand for canned goods (or other foodstuff) in any locality. Once this has been determined for one or two typical cities, towns, and country districts, it will be simple to estimate what any locality in the country ought to consume; you will know where you can hope to find wider markets and where not.

Then, again, we require a more detailed study of consumers' habits and prejudices. You should know what the consumer prefers in grade, quality, price, size, and style of package, and how this preference varies with location, creed, income, and social position. What are the factors that for any given consumer class cause consumption to go up or down? What is the retail price limit which cannot be exceeded without cutting consumption heavily? What are the effects of seasons, weather, holidays, and so on upon consumption of each class of goods?

To answer these and many other questions is the aim of the business research planned by the National Canners' Association. One of the most useful results would be to make possible the forecasting of future demands, so that production can be adjusted to consumption. It reminds one of weather forecasting. "A depression in canned peas has been reported in Iceland to be moving southwards, and may be expected to reach Ireland in three days."

A Consumption Survey.

Already a beginning has been made in putting into practice the above suggestions as applied to the particular case of canned foods, but, of course, the same principles apply equally well to any other food product. Starting in the summer of 1926, a survey of public opinion was made by the United States Department of Commerce by a system of house-to-house canvassing of housewives in certain localities chosen to represent an urban residential area, an industrial town, and an agricultural district. The following summarises the chief results obtained:

The consumption of canned foods was greatest among those whose incomes ranged from £300 to £400 a year; as incomes increased, the consumption decreased. One of the outstanding facts was that the convenience of canned foods was the principal reason for their use. With almost equal unanimity, it was believed that the flavour of fresh or raw products surpassed that of canned, and it was also thought that the former had a higher food value. The consumption of canned foods in winter was from two to eight times as great as in summer, the greatest difference being among those of the lower income groups.

Prejudices.

In discussing the general question of prejudice with the housewives, it was found that there were two main groups of objections—namely, those directed against canned foods as a whole, and those against specific articles. More than one in four of those housewives interviewed have some objection. "Fear of sickness" accounts for nearly half the total objections; this belief, although vague, is quite strongly held. The fear of metallic contamination and of the loss of food value are of about equal prominence, and, taken together, almost equal the "fear of sickness" objection in popularity. The more opulent classes are more concerned about the loss of food value. Other objections, of minor importance, were fear of preservatives, quality of pack, and unsanitary factories.

Canned meats and fish are most frequently mentioned, and the "fear of sickness" is the main objection. This fear seems to be a relic of the earliest days of the industry, when the technical problems had not been worked out and the general character of the goods was poor and frequently questionable. The tradition is still holding on, but may be expected to disappear gradually as the merits of the present-day products become more generally known. In all hospitals visited, canned foods are extensively, and in some cases almost exclusively, used. Only one doctor practising in these hospitals was reported as refusing to allow any canned foods to be given to his patients.

Many of these prejudices have little foundation.

and their removal by disseminating information concerning the value, manufacturing methods, and uses of canned foods, through any means which will reach the largest groups of potential consumers, may be expected to increase consumption. In the United States the consumption, measured by production, has about doubled between 1914 and 1925, while the population has increased only 18·5 per cent.; during the same period there has been a corresponding decrease in the consumption of some of the great staples, such as bread and meats.

Quite apart from the particular case of canned foods, the data given above indicate the useful results which a systematic research may be expected to yield if applied to any other food product.

Preservation of Fish at Sea.

The report signed by M. Belloc, Director of the Biological Station of the French Fisheries Technical and Scientific Bureau, gives one reason to hope that the urgent problem of fish preservation has been at last solved in a simple and economical way. There is a widespread desire on the part of owners of fishing vessels, and also on the part of the public, for an improvement in the methods of preserving fish at sea, so that vessels may take longer voyages, and the recently issued Report of the Privy Council Committee for Scientific and Industrial Research for 1926-27 emphasises the fact that, whilst vessels fitted with appliances for freezing fish at sea have given satisfaction, yet the Board is in the difficult position of having to give advice based on small-scale experiments. It is regrettable that, owing to lack of funds, this important work has been suspended.

Mr. Oscar Dahl, who is interesting himself in the new Kjorstad process of refrigeration at sea, has recently expounded the results of installing the new system in a French trawler. The cost is extremely moderate, amounting, as it does, to something like £100, whilst a 2 h.p. electric motor supplies all the power necessary for working this ingenious invention, which is stated to "freeze the fish to the bone." The catch is, in fact, frozen rigid, without in any way impairing the ultimate quality. Odour, colour, and appearance are reported to be excellent, and a further important point is that the internal character of the fish is greatly improved, in so far as the deterioration of the contents of the stomach and the preservation of the peritoneum intact are concerned. Fish frozen by this system can be transported many miles inland without suffering any abatement of their freshness. It is in all respects the same as when caught, excepting that the heart has ceased to beat. It is understood that a new fishing company is under organisation for trawling in South African waters, and that it is hoped to give this method of preserving the catch at sea a full and fair trial.

Chemistry of Jelly Making.

Mr. W. A. Rooker has recently given his views on what seems destined to be the "eternal triangle" problem of sugar, acid, and pectin. Of these three basic constituents, pectin is undoubtedly the most important, for it is the most elusive, uncertain, and difficult to control. Obviously, the amount of pectin required for jelly making depends upon the characteristics of the particular pectin used; it is misleading to state that any definite amount of unstandardised pectin will give definite results when combined with certain amounts of sugar, acid, and water.

As in the case of pectin, literature is filled with contradictions relative to the amount of acid required for a perfect jelly; probably this is due to the complicated nature of the problem and a disregard for the influences of other factors. Tarr, however, stands out as perhaps the first investigator to approach the problem in a truly scientific manner. His experiments were conducted on the basis of hydrogen-ion concentration rather than total acidity, and they showed that a definite relationship exists between pH and jelly formation. He gives pH 3·40 as the minimum point for jelly formation and pH 3·1 as the optimum. Luer and Lochmuller found that at pH 2·95 to pH 3·05 the strongest jellies are formed, whilst beyond 3·45 no jellies are formed. Of the organic acids, tartaric is the most efficient for jelly making purposes, with malic acid second, and citric third. It is interesting to note that a slight deficiency of acid produces a much greater effect on a jelly than does an equivalent excess; excessive acidity, however, causes "bleeding or sweating" (syneresis).

The amount of sugar may be varied over comparatively wide limits for jelly formation; the usual practice is to prepare jellies having sugar content of 65 to 68 per cent. (Cruess and McNair recommend 65 to 70 per cent.). Singh made a number of experiments, varying the sugar, acid, and pectin content, but his pectin appears to have been of very poor quality. Rooker states that he has prepared pectin of such strength that very firm jellies were obtained when the jelly contained 66·0 per cent. of sugar, 0·35 per cent. of tartaric acid, and only 0·3 per cent. of pectin.

There seems to be a close relationship between the jellying action and the point of saturation for sugar solutions. The presence of invert sugar increases the total amount of sugars soluble in a given amount of water at a definite temperature, but the effects of various amounts of invert sugar in fruit jellies has received little attention. A certain amount of invert sugar is probably of advantage; it produces a finer texture and may possibly counteract the tendency to syneresis.

All these, and many other allied problems, belong to that difficult and incomplete branch of science

known as colloid chemistry. To the chemist these problems converge upon the basic study of the system sugar-acid-pectin, and until very much more research work of a fundamental character has been carried out, neither the "eternal" aspect of the "triangle" problem nor the contradictions in literature will tend to diminish.

Flour Fineness.

Some years before the war it was common practice to dress flour more finely than at present, but little or no advantage was gained, except, perhaps, in colour. Very fine grinding, as G. Van der Lee has stated, adds to the cost, the danger of heating, and the difficulty of sifting. Silk gauze does not give accurate separation according to particle size, the material passing the sieve being much finer than corresponds to the size of the holes; the finer fractions have lower nitrogen content and higher diastatic power.

In the April issue of the *Arkady Review*, A. B. Bradley gives some interesting photo-micrographs of coarsely ground American flour and coarsely and finely ground English flours, and, as Mr. Ford notes, the particles of the American flour have angular outlines and very few starch granules have been broken away; in the case of the English flours, starch granules can be seen to have been liberated from the mesh-work of protein in greater or less amount according to the degree of grinding.

Vegetable Concentrates.

Vegetable concentrates are the latest development in foods, and after several years of experiment a company is proposed with the object of placing these new extracts on the market.

Confectioners' Exhibition.

The Schedule of Competitions to be held at the Bakers' and Confectioners' Exhibition in September next is now being formulated, and the Committee will meet shortly to consider suggestions, offers of prizes, etc. Should any member of the trade have any suggestions to offer it is hoped that these will be sent to the Manager, Mr. H. S. Rogers, 11, Queen Victoria Street, London, E.C.4, as soon as possible.

Book Reviews

Food Wisdom. By. D. D. Cottington Taylor A.R.S.I. (assisted by P. L. Garbutt, A.I.C.). (Sir Isaac Pitman and Sons.)

Now that the new Public Health Regulations have come into force, this book by Mrs. Cottington Taylor, the Director of the "Good Housekeeping" Institute, is of especial interest to housewives, for it explains clearly the provisions and effects of the new Regulations as they concern preservatives. After a brief summary of the causes of food decay, Mrs. Taylor passes on to the main subject of her book, which is food preservation. Heat, dryness, pasteurisation, bottling, pickling, chemical preservatives, and other methods of preserving food are described; there is a special chapter on the use of low temperatures, and household refrigerators are dealt with in detail. Other useful features are suggestions for drawing up menus, and notes on the quantities of food required for large parties. A number of attractive recipes for iced sweets complete this handy little book, which should be really helpful to all who are responsible for the preparation and care of food.

A. B. CALLOW, M.A., M.Sc., M.S.

Food and Health. By Mrs. A. Barbara Callow, M.A., M.Sc., M.S. London, Oxford University Press, 1928. Price 2s. 6d.

This small handbook, although it condenses into its ninety-three pages an amazing amount of information, is published at the extraordinary low price of 2s. 6d. The following is a list of its contents: The Chemical Nature of Foodstuffs; Digestion; Food as Fuel; The Discovery of Vitamins; Rickets; The Choice of Food; Patent Foods; How to Arrange a Diet; Diets for Mothers and Children; Food as a Cure for Disease. There are several valuable tables, and eight illustrations.

The book presents in an attractive style all the essential facts, which have been scientifically established, relating to matters of food and health, and it constitutes an admirable introduction to the study of diet.

Special Canada Number

British manufacturers, especially machinery manufacturers, have a wonderful opportunity in Canada, and Canadian firms will welcome first-hand information concerning British-made equipment. In order to make this contact, the May issue of FOOD MANUFACTURE *will be devoted to the Canadian food industries, and will include the following:*

Canada as a Market for British Goods (Editorial).
The Biscuit and Confectionery Industry.
The Jam, Pickle, and Allied Industries.
The Meat Industry.
Gelatine and Fish Meal.
"The Salmon Canning Industry," by Dr. E. D. Clark, Director, and Dr. R. W. Clough, Chemist, North-West Branch, National Canners' Association, Seattle, Washington, U.S.A. This original article is the most comprehensive that has appeared on the salmon industry.

The Efficiency of Fuels

By "M. I. M. E."

The cost of heat or power is mainly represented by expenditure on coal. This is the key end of the business of manufacture; yet numbers of power users are still without any knowledge of combustion engineering, and, as a consequence of this costly ignorance, they fail to supervise the process of heat production. Brains in the boiler-house pay good dividends, and avoidable losses in efficiency represent "cumulative errors," which may spell the difference between profit and loss.

PART III

I ONCE heard a well-known official assert that, whilst owners and directors do not hesitate to pay first-class wages to their foremen, yet they are apt to consider any man with a strong arm and a thick head as a suitable medium for the handling of thousands of pounds a year in the form of coal. In fact, the stokers and firemen are often paid "unskilled wages," and the "boss" never thinks of investigating the efficiency of his boiler plant.

Frequency of Firing

The influence of the frequency of firing is a matter demanding special consideration, for the rate at which any given coal should be fed to the furnace depends, in great measure, upon the character of the coal. I have found, as the result of wide experience, that coal is usually fed in too large quantities and at too long intervals. Think for a moment what this means. The unavoidable result is a series of decided and critical changes in the condition of the fire. As food manufacturers, we can appreciate the effect of eating a vast amount of food once a day, instead of smaller quantities at a greater number of times. It is obvious that efficiency, in regard to the frequency of firing, is solely dependent upon the fireman, and the only alternative is the mechanical stoker.

Some years ago, a French engineer embarked upon a series of practical experiments, for the purpose of ascertaining the relative results of different rates of firing, with the same fireman and the same boiler. It is unnecessary to reproduce his results in full, but the advantage of the smallest charge over the maximum, ranges, in the two series of trials, between 3·03 and 8·19 per cent. These results were obtained notwithstanding the fact that, with the more frequent firing, the doors were more frequently opened. A boiler arranged so that the damper became closed, or nearly so, when the door was opened, showed upon test, an increased evaporation of 14 to 15 per cent. due to this arrangement.

Smoke

The sixth sub-division of our survey is entitled "loss on account of smoke." This loss is absolute; but it is also comparatively insignificant. It is a loss equivalent to directly robbing the fire of a part of the fuel from which not only has no heating effect been secured, but upon which heat has actually been wasted in raising it to the temperature of the escaping flue gases. If, however, your boilers are skilfully operated, the actual amount of unconsumed carbon passing away from a well-constructed boiler, in the form of smoke, seldom if ever exceeds one per cent. of the total amount of carbon in the coal. Smoke is the subsequence of incomplete combustion. Its prevention is sought and found through the provision of an ample supply of air, with sufficient intensity of draught, and the maintenance of a high temperature of the fuel bed.

Nowadays, the abatement of smoke is a matter of legal obligation. There are computed to be some ten million domestic hearths burning cheerily on a winter's day—it is from these that the "nuisance" arises, and not from the factory chimney. But as smoke abatement is also good business, I will append a list comprising the eight classes of contrivance which have been applied for the purpose of smoke prevention. Here is the approved schedule:

(i.) Arrangements for admission of air above the fire, under which may be included steam jets for inducing a flow of air.
(ii.) Firebrick arches placed over the bridge wall or near the end of the fireplace, for the purpose of mixing and heating the gases.
(iii.) Mechanical or forced draught.
(iv.) Hollow walls for pre-heating air.
(v.) Coking arches or chambers constructed in front of the fireplace, whence the coke is pushed to the rear as the volatile matter is distilled off.
(vi.) Double combustion, whereby part or all of the gases are passed a second time through the fuel.
(vii.) Down draught furnaces in which the air is admitted above the grate, and the gases pass down through it and thence to the heating surface.
(viii.) Automatic stokers.

Taken together, this list furnishes an excellent table of methods, enabling those interested to make their choice, or combination of choices, with all the methods before them.

An actual test, with a good quality bituminous coal, 81 per cent. carbon, serves to illustrate our point that smoke is not a factor representing serious losses. The total quantity burned, in the boiler under

test, during one week, was 12,890 pounds, the total quantity of flue gases (reduced to 72° C.) being 4,263,119 cubic feet, and the total quantity of solid matter 42·63 pounds. There was, therefore, present in solid form in the flue gases only

$$\frac{42{\cdot}63}{12{,}890} = {\cdot}0033 = 0{\cdot}33 \text{ per cent.}$$

of the matter originally present in the coal. No doubt only half, or less, of this recovered matter represents carbon, for its grey colour indicates the presence of inorganic ash. It is evident that, under the conditions of the test, the proportion of carbon which was carried off in black smoke was about one-sixth of one per cent. of the original coal.

Incomplete Combustion

Turning now to the question of loss on account of carbon dioxide, we come across a far more serious affair. The loss of efficiency, which follows upon the escape of carbon monoxide unconverted into carbon dioxide, is due to the smaller amount of heat given out upon the incomplete combustion of carbon into carbon monoxide. Acting on the principle that "seeing is believing," we will append a short table of the heat of combustion, as measured by the number of British Thermal Units that are given out upon the combustion of one pound of a given substance, for each of the following six examples:

Carbon burned to CO_2	14,650	B.T.U.
Carbon burned to CO	4,400	,,
Hydrogen	62,100	,,
Marsh gas, CH_4	23,513	,,
Ethylene, C_2H_4	21,343	,,
Carbon monoxide burned to CO_2 ...	4,393	,,

On reading this table, you will immediately perceive the enormous loss of heat due to incomplete combustion. The differences between the total heat of perfect combustion of carbon to carbon dioxide—namely, 14,650 B.T.U.—and that of carbon to carbon monoxide, 4,400 B.T.U., are far too striking to call for further emphasis. Carbon monoxide is the product of incomplete combustion, and it is a remarkably expensive product, when one considers the relative prices of coal and air.

Efficiency

If the engineer obtains, in boiler practice, a maximum efficiency of round about 90 per cent., he is fully entitled to evince proud satisfaction—for he is, under such circumstances, surely one of the elect. The losses he encounters are loss of heat through radiation, heat carried off by the gases, and, worst of all, incomplete combustion. All these losses are minimised in high-grade boilers, fitted with warm blast or feed water heating apparatus; and, under ordinary conditions, a good coal should ensure an average efficiency from 60 to 70 per cent., whereas with poor coal this may drop to 50-60 per cent. The custom is to roughly figure the available heat of combustion, per pound of fuel, as from 10,000 to 12,000 B.T.U.

Excess Air

Finally, what can one say usefully in regard to the loss due to excess air? Theory and practice would seem to be at variance in this matter. In practice, despite the fact that all excess means loss of efficiency of the fuel, it is necessary to supply enough surplus of air to ensure complete combustion, even if loss is occasioned thereby. It is a practical impossibility to distribute the amount of air theoretically necessary for the perfect combustion of a given fuel, so as to secure the ideal result. The real question revolves upon what this excess should be, considered from the economical point of view, and this is a requisition only answerable by direct, practical experiment. The required excess of air varies with the character of the fuel, its rate of combustion, the temperature of the supply, and the intensity of the draught.

Under ordinary conditions of boiler practice, with chimney draught, the theoretical loss of efficiency, when excess of air is supplied and the products of combustion escape at temperatures above the atmosphere, is a working loss which cannot be avoided. For example, a pound of coal having a heat value of 11,720 B.T.U., on combustion with an air supply 100 per cent. in excess of that theoretically (or chemically) required, a temperature of escaping gases 450 degrees above the atmosphere, and burned under the ordinary conditions of boiler practice with chimney draught, will usually demonstrate a loss of no less than 17·0 per cent. These chimneys require high temperatures of gases in order to produce the draught, but this loss is vastly minimised with mechanical means of draught production. It is computed that a moderate reduction to 75 per cent. excess air supply, and 300 degrees in temperature, would show an economic gain of 7 per cent.

All these considerations indicate how cautious the consulting engineer has 'o be when dealing with the practical as opposed to the theoretical aspects of excess air. From data revealed by experiment, one gathers that the best practice consists in keeping the volume of air admitted as low as possible. But the actual result of such restricted supplies is a dull fire, with abundant smoke; and we further encounter that most serious practical objection concerned with the difficulty of maintaining the fire under varying conditions of load or demand. Insistence on theory in this matter would, in fact, yield a fire demanding tender care and attention on the part of the fireman; and, despite his utmost endeavour, the operative would probably fail to raise steam when suddenly required.

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Canning Research

The following is extracted from Bulletin No. 103-A, "Scientific Research Applied to the Canning Industry," which has recently been issued by the National Canners Association, Washington, D.C., and is continued from last month's issue. As we have pointed out, this pamphlet gives a survey of the scientific work carried out in the Association's laboratories.

PART III.—PROCESSING STUDIES

THE STERILISING operation in the canning industry is known as "processing." The time and temperature at which a product is heated for the purpose of sterilisation is called the "process." Until very recently the processes employed in the industry were purely arbitrary and were the result of experience. If the canner encountered an unusual amount of spoilage it was his custom to increase either the temperature or time of process. On the other hand, if he went along for a good while with a very small amount of spoilage he would likely try to reduce the temperature and time of processing in order that he might improve the appearance of the product. Occasionally a canner would have a good deal of spoilage with the same process he had been using for years with success. When this occurred he was likely to feel that his previous successful use of the process had demonstrated that it was right and that the spoilage he had for a short time was due to faulty tin plate or something abnormal in other materials.

In 1918 the research laboratories began a series of processing studies which has done much to remove the processing of canned foods from the realm of luck and chance by contributing exact information of a fundamental nature.

Fish Flakes: A Canadian Scene.

(*See Notice on page* 308.)

Heat Penetration

Some preliminary work on the heat penetration of canned foods on a laboratory scale and from a laboratory standpoint had been done prior to 1918. That year the research laboratories developed an apparatus which is adapted to the determination of heat penetration in cans located in any part of a retort during commercial canning of foods. In this way the distribution of heat in the retort can be studied and a comparison made of canned foods which receive different treatments, for it is possible to determine the heat penetration in a number of cans at the same time. In 1920 a preliminary bulletin on heat penetration (Bulletin 16—L) was published, giving a summary of the results obtained and a statement of principles of heat penetration. Since that time the work has been continued and the new data are now being arranged for publication.

Heat Resistance of Bacteria

To make practical use of results obtained in the heat penetration work it was necessary also to study the heat resistance of spoilage bacteria. When this was taken up it was found that very little was known about the heat resistance of bacterial spores. Much work had been done with the heat resistance of pathogenic bacteria and of non-spore-bearing bacteria of the lactic acid type, but the subject of heat resistance of bacterial spores had been neglected. The methods that had been used for this purpose were not adapted to giving results of the accuracy required for the laboratories' purposes. It was necessary, therefore, first to develop methods and apparatus and then to study the heat resistance of the spores of the various kinds of bacteria that cause spoilage in canned foods. This work was facilitated by the large number of spoiled samples sent to the laboratories by individual canners who desired information regarding the cause of spoilage. The bacteria in very many of these samples had resisted the ordinary commercial processes. The bacteria that survived these processes, therefore, possessed a high degree of resistance to heat and afforded an excellent assortment of material for the investigation.

Influence of Acidity on Processing

In connection with the processing investigations a study was made of the acidity of various canned foods, the change of acidity during processing, and the influence of this acidity on the process required for sterilisation. The work previously done on the acidity of canned foods had been limited almost entirely to the determination of the percentage of free acid present as determined by titration. To consider the effect of the acidity from a bacteriological standpoint it was necessary to determine the hydrogen-ion concentration of the foods, which is a measure of what has been termed the intensity of the acidity, rather than the amount of free acid present. It is the former rather than the latter that influences the process necessary for sterilisation.

The information gained by this study of acidity was of great value to scientific men in shedding light on exactly what is done in processing. It helped to explain the various kinds of bacteria that cause the spoilage of different products. For instance, fruits, tomatoes, and kraut are far more acid than vegetables, fish, and meat. The former group of products are not spoiled by spore-bearing bacteria because bacterial spores will not develop in them on account of the relatively high acidity. Fruits, tomatoes, and kraut, therefore, only require a process at or below the boiling point of water, because non-spore-bearing bacteria are readily destroyed at these low temperatures. Again, string beans and asparagus have a higher acidity than corn and peas. Some spore-bearing bacteria will grow and cause spoilage in string beans and asparagus, but the most resistant ones, those which give the greatest amount of trouble with corn and peas, will not. The processes necessary to sterilise string beans and asparagus are, therefore, much lower than would be necessary if the more resistant bacteria would grow in them. These statements are given only by way of illustration of the mass of information gained on this particular subject.

Definition of Adequate Processes

From the foregoing it will be seen that the time and temperature in processing canned foods are influenced profoundly by the heat penetration, the resistance of spoilage bacteria that will grow in the food if not destroyed in processing, and the acidity of the food. There are other factors which are not understood. The spores of a certain bacterium may require somewhat more heat for their destruction in one food than another, though the heat penetration and acidity be the same. The factors mentioned are of fundamental importance, however, and must be kept in mind.

It is possible from the data obtained by the methods mentioned above to calculate a theoretical process that should be adequate to sterilise a certain food in cans of a certain size, contaminated with a certain number of bacterial spores whose heat resistance has been determined. The development of methods for this calculation was exceedingly difficult and complicated. They were developed, however, and printed in a bulletin of the National Research Council. In order to establish appropriate processes the laboratories first calculated theoretical processes of the character just described. Cans of the various foods were then inoculated with typical spoilage bacteria and processed at the temperature and time of the theoretical processes calculated, and for shorter and longer times. This work was done on an extensive scale, during a single year more than 40,000 such inoculated cans being processed and studied. The work thus done gave valuable information regarding processes necessary for sterilisation.

Sources of Spoilage Bacteria

The processes established as described above were based on the supposition that a considerable number of spores of heat-resistant spoilage bacteria will be present. This work has demonstrated that the number of bacteria of a certain kind present greatly influences the time and temperature of process necessary for sterilisation. If for any reason the number of spoilage bacteria is abnormally increased in the

(*Continued on page* 314.)

The Candying of Fruit

By W. V. CRUESS,
Associate Professor of Fruit Products, University of California.

Professor Cruess sends us the following directions for preparing candied or glacé fruit on a small scale. This account was first published in the Pacific Rural Press about two years ago and attracted considerable attention amongst the California fruit growers, many of whom made handsome profits on candied fruits prepared at the farm in spite of their fancy price. We believe it will prove interesting to readers on this side.

Preparing the Fruit

USE FIRM ripe fruit. Peel and pit peaches. Peel, cut in half, and core pears. Cherries, Royal Anne preferred, should be stemmed and pitted. Apricots must not be too ripe; do not pit—puncture the flesh to the pit in several places with a silver fork. Treat prunes and plums in the same manner as apricots. Use firm figs, preferably Kadota; no cutting or puncturing required. Jujubes should be punctured to the pit with a fork or the skin should be slit lengthwise in several places with a razor blade to admit syrup.

Citron (from trees and similar to a lemon): cut in half, scoop out the pulp, store in strong brine, three-quarters of a pound of salt per gallon of water, for two weeks.

Orange and lemon peel: cut the fruit in half and remove flesh.

Preliminary Boiling and First Syrup

The object of this boiling is to modify the texture of the fruit so that it will absorb the syrup without shrivelling.

Boil orange and lemon peels in water until soft—about sixty minutes. Boil grapefruit peels and citron in several changes—six to seven—of water to get rid of bitterness and to make the peels tender.

When the peels are thoroughly cooked and tender place them in the first syrup described below, boil five minutes, and set aside twenty-four hours.

Instead of boiling other fruits in water, boil them in a light syrup, which consists of one cup of Karo or other corn syrup and three cups of water or one part of confectioners' glucose to three parts of water. Boil in a tightly covered pot until tender—the time will vary greatly with the variety of fruit. Thus plums, freestone peaches, and apricots will require fifteen minutes or less; pears, clingstone peaches, and firm figs twenty to forty minutes. In any case, boil the fruit until tender, but not until soft and mushy. Set the fruit and syrup aside in a stoneware jar or other convenient vessel, such as an agateware pot or dish pan, for twenty-four hours.

Second Boiling

About twenty-four hours after the first boiling, drain off the syrup and, if a Balling hydrometer is available, test the syrup. A Balling hydrometer is used in California for testing the sugar content of grapes and oranges. It is not at all necessary for home use, but is convenient for small or large commercial fruit candying. Prepare a mixture of equal parts Karo syrup and cane-sugar, or of one part confectioners' glucose and two parts cane-sugar. To mix, warm the corn syrup or glucose until thin, add the sugar and mix thoroughly. Add enough of this mixture to the syrup from the fruit to increase the Balling degree to 35-40° Balling.

If a hydrometer is not available, merely measure the syrup from the fruit and to every four volumes (or four cups) add one volume, or if measured in cups, add one cup of the mixed corn syrup and sugar.

Dissolve.—Add the fruit to the syrup and boil the mixture two to three minutes. Return to the stoneware jar and allow to stand twenty-four hours. If the fruit floats, place a wooden grating or plate on it to keep it submerged.

Subsequent Boilings

At twenty-four hour intervals drain the syrup from the fruit and add enough of the corn syrup-sugar mixture to increase the Balling to 50, 60, 70, and 75° Balling on successive days. Boil the syrup and fruit together each day for two to three minutes and return it to and store it in the syrup. If a Balling hydrometer is not used, measure the syrup each day and add one cup of the mixed corn syrup and sugar to four cups of the syrup, and repeat daily until the syrup is very thick, about like strained honey.

Storage in Final Syrup

Store the fruit in the final syrup of 74° Balling (or as thick as honey) for at least two weeks to permit the fruit to become as plump as possible. If at any time during this storage even the slightest evidence of fermentation or moulding occurs, heat the fruit and syrup to boiling for two to three minutes. If crystals of cane-sugar appear, heat until dissolved.

Draining after Drying

After storage in the final syrup, remove the fruit. Dip it momentarily in hot water and drain it free of adhering syrup.

Place the fruit on screen trays, such as window screens tacked to wooden frames, and allow to dry until of about the texture of commercially packed candied fruit.

Or, dry on screens in an evaporator or dehydrator at 120-130° F. until of the desired texture. Usually four to six hours' drying are required. Pack in candy boxes after drying.

Pectin Glacé

Fruit prepared as described will be more attractive in appearance and less apt to develop a coating of sugar crystals if coated with a dilute pectin solution.

A solution prepared from dry pectin such as powdered lemon pectin or apple pectin is to be preferred to pectin syrups containing juice impurities, as the latter are apt to cause the coating to be sticky.

Dissolve one ounce or one level tablespoonful of dry pectin in two quarts of water by heating and stirring and allow to cool, or dilute any good household pectin syrup with two volumes of water to one of the syrup.

Remove the fruit from the final syrup, dip momentarily in hot water, drain twenty to thirty minutes to remove syrup. Dip in the pectin solution. Drain and dry as previously described at room temperature four to five days or in the evaporator at 120-130° F. for four to six hours. Pack in candy boxes.

Vacuum Packing

In experiments conducted in the Fruit Products Laboratory in 1921, it was found that candied and glacé fruits could be kept indefinitely in glass jars or tin cans sealed under a vacuum. Suitable equipment for packing the fruit in this manner on a commercial scale is available.

The vacuum prevents moulding and insect growth, and the air-tight seal prevents drying out of the fruit.

Preservation of Fruit in Final Syrup

The fruit will keep in the final syrup indefinitely. For convenience the syrup and fruit may be brought to boiling and sealed scalding hot in fruit jars or cans. No further treatment is necessary.

The cans or jars may be opened later, the fruit drained, dried, and glacéd as previously described. Preserving factories and canneries could use this method of distributing fruit for candying purposes to candy makers and housewives. It was used successfully in the Fruit Products Laboratory in 1921.

In commercial factories the fruit is stored in open pans in the final syrup until needed for "finishing off" and packing.

Utilising the Surplus Syrup

The relatively large amount of syrup remaining after candying may be used in candying subsequent lots of fruit or in candying fruit for home use, or on the table, or made into jelly as follows:

Add one volume of pectin syrup to three of syrup and to each quart of syrup about one half-teaspoonful of citric acid dissolved in one-fourth cup of water. Boil to the jellying point, 220° F. Instead of pectin syrup, dry pectin may be used. Dissolve two level tablespoons of pure pectin powder or four of 50 per cent. pectin in one cupful of water by heating. Add this to one quart of the syrup and proceed as with the pectin syrup.

Fondant may be made from the syrup by adding one pound of sugar to three pounds of the syrup, cooking to 240-242° F.—that is, to a "medium ball"* cooling to about 110 F°., and stirring vigorously until the syrup grains or creams; work to a smooth fondant and flavour with ground candied fruit or with vanilla, etc.

Spoiling of Candied Fruit

Candied fruit may mould if not sufficiently dried before packing.

On long storage it may become hard or filled with sugar crystals. It should be consumed fresh.

It may shrivel during the syrup treatment—usually an indication of insufficient cooking during the first boiling. Place such fruit in water, boil until tender and plump, and return to the syrup, proceeding with the candying process in the usual manner.

In boxes candied fruit sometimes becomes infested with insects. It should either be used within six weeks to two months after packing or should be packed in insect proof containers.

* "Medium ball" means that a spoonful of the hot syrup dipped into cold water will form a medium soft ball on cooling.

(*Continued from page 312.*)

product filled into the can, the time or temperature of process required for sterilising is greater than would otherwise be necessary. It became important, therefore, to learn the source of these resistant bacteria and the reasons for their multiplication in canning plants to a greater extent at some times than at others. It became important to know why a longer process or higher temperature is necessary in one plant than in another, or within the same plant at one time than at another.

Work on this phase of the problem was begun in 1926. A bacteriological survey of the industry was undertaken which, even during the first year, shed considerable light on the question. The results obtained concern principally sources of bacteria preferring relatively high temperatures for growth—the thermophiles. It had been assumed that these spoilage bacteria were commonly present in soil and came into the canning plant on the raw product. We were surprised to be unable to detect them on the raw product, and if present they must have been there in small numbers. This does not hold for other types of spoilage bacteria—for example, the putrefactive anaerobes—as these have been found in soil and on the raw product. On the other hand, the thermophilic spoilage bacteria were found in standard refined granulated sugar. It was also found that under certain conditions of managing the canning plant these bacteria multiplied to a much greater extent than under other conditions.

Before this bacteriological field survey was undertaken it was necessary to make an extensive study of all of the hundreds of cultures of spoilage bacteria in the laboratories for the purpose of classifying them, because such classification was necessary to plan the details of the field survey.

History of Food Laws

By T. G. JOYCE, B.Sc., F.I.C.

AMONG THE penalties for living in civilised times are the payment of taxes and submission to laws.

Several cases of sophistication are recorded before the Christian era; probably the earliest to be detected was about the year 250 B.C., though this had no relation to food. At that date, however, neither adulteration nor analytical chemistry was an exact science, though a certain amount of ingenuity was displayed in the former and some scientific knowledge was shown in the latter. For systematic adulteration to be practised, there must be the stimulus of trade; without it fraud of that nature has no incentive. Hence we find that in our own country the real history of this art commences during the eleventh century.

By the end of the twelfth century crime was indulged in to the full, and the food providers used every known artifice to fleece the consumer and gain profit for themselves. This state of things continued until it became necessary or possible to take measures against it. The trades that first called for censure were those known as the bakers, the pepperers or spicers, the brewers, and the vintners.

In 1202 "The Assize of Bread" was passed with the intention of regulating the price of bread. This was followed in 1286 by "The Statute of Assize." This law at first did not do much to check adulteration, and clauses were subsequently added, as the Assize of 1582 and the Assize of 1634. These Assizes, taken together, may be regarded as an early attempt to provide a "Sale of Food Act."

Concurrently with these regulations the London pepperers, or spicers, came under an ordinance in 1316, wherein they were forbidden certain forms of adulteration. The brewers and vintners also came in for regulations, but these seem to have been purely local—*e.g.*, a mayor appointed an "ale-taster" to sample beer as to quality; and similar measures were taken as to wine.

And so things went on till the year 1718, when a law was passed relating to coffee, followed by one in 1724 relating to tea and coffee; in 1730 relating to tea; in 1733 relating to hops; in 1776 relating to tea; in 1816 relating to beer and porter; in 1836 relating to bread; and in 1840 a Treasury note relating to coffee.

Although these laws had nominally, as one of their objects, the protection of health, yet it is easy to see from the class of articles selected that revenue was the first consideration.

However, other minds had been at work considering things from a medical point of view, and in 1860 we had the first general Adulteration Act in this country—viz., The Adulteration of Food and Drink Act. This was followed in 1868 by the Sale of Poisons and Pharmacy Act, in 1872 by the Adulteration of Food and Drugs Act, with the optional appointment of public analysts, and in 1875 by the Sale of Food and Drugs Act, with the compulsory appointment of public analysts.

This was an Act to repeal the Adulteration of Food Acts and to make better provision for the sale of food and drugs in a pure state. The Act is still in force. It is the first Act to place the health considerations in a prominent position, leaving questions of revenue to be dealt with by the Department of Customs and Excise. The term "food" used in this Act includes every article used for food or drink by man, other than drugs or water. It is forbidden to mix injurious ingredients with food, and to sell "to the prejudice of the purchaser any article of food or any drug which is not of the nature, substance, and quality of the article demanded by such purchaser." It is permitted to add ingredients, if not injurious to health, if required in the preparation of the article or to render it in a fit state for carriage or consumption.

As there were several ambiguities in this Act, in 1879 we had the Sale of Food and Drugs Act Amendment Act. This was "an Act to amend the Sale of Food and Drugs Act, 1875." The Act makes it clear that an article of food sold must be of the nature, substance, and quality of the article demanded—all three, not only one or two of them.

In 1882 an Act was passed relating to substitutes for coffee and mixtures of coffee and other articles; in 1883 the Statute Law Revision Act; in 1885 an Act relating to beer; in 1887 the Margarine Act, an Act for the better prevention of the fraudulent sale of margarine; in 1899 the Sale of Food and Drugs Act. This was an Act to amend the law relating to the sale of food and drugs. *Inter alia*, in this Act it is laid down that an article of food shall not be deemed to be adulterated by reason only of the addition of any preservative or colouring matter of such a nature and in such a quantity as not to render the article injurious to health.

Included in the term "food" are here added "articles which ordinarily enter into the composition or preparation of human food and flavouring matters and condiments."

We had the Sale of Milk Regulations in 1901 and the Sale of Butter Regulations in 1902. In 1907 came the Butter and Margarine Act, an Act to make further provision with respect to the manufacture, importation, and sale of butter and margarine and similar substances. In 1912 we had the Sale of Milk Regulations and the Public Health (Milk and Cream) Regulations. These latter regulations prohibit the addition of any preservative substance to milk or to cream containing less than 35 per cent. by weight of milk fat, and restrict the preservative substances that may be added to cream containing 35 per cent. or more by weight of milk fat to (1) boric acid, borax, or a mixture of these preservatives, or (2) hydrogen peroxide.

(*To be continued.*)

Bacteriology Applied to Food Manufacture

By "A WORKS CHEMIST"

A chemist employed in a food factory has sent us the following notes on a book entitled "Bacteriology for Students in General and Household Science," by Estelle D. Buchanan, M.S., recently Assistant Professor of Botany, Iowa State College, and Robert Earle Buchanan, Ph.D., Professor of Bacteriology, Iowa State College, and Bacteriologist of the Iowa Agricultural Experimental Station. Revised Edition, Pp. xvii+560, with 360 figures in the text. Price 11s. net. New York, 1924. The Macmillan Company.

AS STATED in the Preface, this work is "a revision of the lectures given during the past eight years to students in Home Economics at the Iowa State College of Agriculture and Mechanic Arts."

"The volume has been divided arbitrarily into five sections: the first on morphology and classification, the second on cultivation and observation of micro-organisms, and the third on physiology are in a sense introductory; the fourth section on fermentations and the fifth on the relationship of micro-organisms to health are planned to point out and emphasise the relationship of bacteriology to the preparation and preservation of foods and to household sanitation and personal hygiene."

The foregoing extracts from the preface briefly state the object and nature of this volume, which is well written, interesting, and instructive.

To the food manufacturer it has become increasingly necessary to have more than a general idea of bacteria, yeasts, and moulds if he wishes to produce products of the highest keeping quality, and for this purpose the book is specially adapted.

Naturally, at the commencement, a general account is given of the principles of bacteriology and the general methods of laboratory practice.

The instructions for carrying out bacteriological investigations, such as preparation of culture media, methods of culture, and sterilisation, are clearly described.

The classification of the micro-organisms is fairly exhaustive. The illustrations are numerous and should be exceedingly useful in identifying micro-organisms by means of the microscope. The Appendix contains a key to families and genera of common moulds with over 140 descriptive figures.

This book is a very welcome addition to literature of commercial interest. Hitherto, works on bacteriology have been more adapted to the use of medical science, dealing with the identification and prevention of disease of the human body in particular. This volume, however, covers a wider field, and fills a gap in the study of food deterioration which has been left open too long.

The destructive agencies are putrefaction, fermentation, and mould. Each manufacturer of food products has his own problems to solve. Up till the present time, reliance has been placed on the fairly free use of chemical preservatives and the causes of deterioration have been overlooked. Now, however, the causes must be known and prevented. Haphazard guessing will not help. The only method is a careful examination of the raw material and the process of manufacture from beginning to end. Such an examination can be conducted only on proper scientific lines. This volume gives instructions for such an investigation, how to set about it, and by diagrams and figures shows how to identify offending micro-organisms, and suggests methods counteracting their influence.

It is too comprehensive a work to go into here: there are descriptions of particular micro-organisms, how they infect food, how they act, and how they may be avoided, but anyone sufficiently interested can look up in its pages practically all that is known about these matters. In general, changes brought about by micro-organisms are given at length. There is a chapter on micro-organisms and food preservation; putrefaction and fermentation are discussed, also the effects of moulds. There is also a section on micro-organisms and health, relative to diseases. There is a chapter on water contamination, examination, and purification, one on air contamination and examination, one on milk, its contamination and examination, and one on food (excepting milk), its contamination by injurious micro-organisms and its examination.

The whole volume is interesting and instructive. Accounts of the micro-organisms that may be found in food are so complete that it is impossible to give abstracts of any value. To anyone wishing to understand the relationship of micro-organisms to food, their use and their destructive powers, the preservation of food, and methods of scientific investigation relative to these, we strongly recommend this volume as being clear, concise, and a most able guide.

A delightful Calendar in the guise of a clock, the date pointed out by the minute hands and the day and month easily altered by a touch of the finger, reaches us from Messrs. Robinson and Sons, Ltd., of Chesterfield. As would be expected from specialists in cardboard products, the Calendar is cut in an attractive design, and while not flamboyant is very distinctive.

Enzymes

By F. W. JACKSON, A.C.G.I., B.Sc., A.I.C.

The following notes have been made by Mr. Jackson after the critical reading of an important book on "Enzymes" published recently by Messrs. Baillière, Tindall and Cox. ("Enzymes: Properties, Distribution, Methods of Application." By Selman A. Waksman, M.S., Ph.D., and Wilburt C. Davison, M.A., M.D. Pp. xii+364. With 10 figures in the text. Price 25s. net. London, 1926. Baillière, Tindall and Cox.)

IT IS somewhat of a formidable task to write an article upon a subject about which so little is really known. And yet that is the true position with regard to enzymes, those strangely elusive catalytic agents which seem literally to go hand in hand with Life itself. Possibly the earliest types of enzyme action to receive attention are those classified as fermentations, and it is rather curious that the word "enzyme" was suggested by Kuhn in 1876 (from the Greek "in leaven"), although the actual separation of the yeast ferment from its cell-wall container was not completed until 1900 by Buchner and Hahn. With this momentous discovery, the modern conception of an enzyme was founded; thereupon the study of enzymes made such extremely rapid headway, that it may now be regarded as an important branch of Biochemistry.

An enormous number of observations and facts about enzymes has been recorded. Enzymes appear to be universally distributed in living animal and vegetable tissues, and active extracts may be prepared therefrom by means of suitable technique. Probably the extracts so obtained are never homogeneous, and all attempts to purify exhaustively have so far proved fruitless. The extracts may be concentrated, or their activity increased, by appropriate means, and solids showing all the activity of the original material may be obtained.

An interesting phenomenon frequently accompanies attempts at purification. It is possible, in certain cases, by dialysis or other means, to separate an enzyme solution into two portions, neither of which is active alone, but activity is restored on mixing the two solutions, one of which may be boiled without changing its power of activating the other; this latter fraction is, however, thermo-labile. Thus we have the recognition of "co-enzymes," diffusible and thermo-stable substances, often partly inorganic, which activate the thermo-labile "enzyme" itself.

A small quantity of enzyme is capable of catalysing an enormous amount of reactive material. The rate of action of enzymes is affected by temperature, acids, alkalies, and many metallic salts. Enzymes are liable to be permanently poisoned or temporarily paralysed when treated with certain substances.

Another striking point about enzymes is their selective action. Each type of reaction requires its special enzyme, and evidence is increasing to show that even the molecular configuration of the substrate is an important factor; thus an enzyme may be sufficiently sensitive as to discriminate between stereo-isomerides, and the relationship between enzyme and substrate has been compared with that of a lock and its key. Frequently it has been possible to show that an enzyme material which can act on a variety of substances is really a mixture of several enzymes each with its own specific function.

Enzymes in Industry

These strange chemical agents are of vast commercial importance. It is, perhaps, an easier task to enumerate those industries in which enzyme activity is *not* utilised. To the food manufacturer, they present an infinity of aspects. They may assist him in his processes, or, on the other hand, they may tend to spoil his finished products; for all the alimentary principles are capable of change under the action of enzymes; starches become sugars, sugars become alcohol, proteins are peptonised and fats become rancid. It is true that these changes may also be due to bacteria, but it is usually possible to differentiate between the two agents, since enzyme action continues, as a general rule, in the presence of chloroform or toluene. Enzymes are frequently used in the laboratory for both qualitative and quantitative work, and they are also finding many applications in medicine.

Of recent years, the reversible character of many enzyme actions has received attention. Apart altogether from the inherent attraction of the subject from a physico-chemical standpoint, it is apparent that, behind these synthetic phenomena, there may lie hidden the secret of the growth process which is the outward manifestation of activity in both animal and vegetable kingdoms. It is so usual to associate enzymes with disintegrating processes like hydrolysis, oxidation, and so on, that one finds it difficult to believe that they may also act as Nature's skilled workmen of construction.

Waksman and Davison

We have just been reading a new book on "Enzymes" by Waksman and Davison, and we should like to recommend it to our readers. In doing so, let us not be misunderstood. This book is not a critical review of the subject for the academically-minded. Nor is it a practical handbook, or a laboratory guide. Rather is it a comprehensive collection of the known facts about enzymes, together with a very full bibliography.

On submitting several specific questions to the book, it was able to answer most of them. But we must confess that after reading it we laid it down with a feeling of intellectual hunger, in the sense that we found little in it to stimulate thought and ideas. It belongs to the "Encyclopædia" class and, as a reference book, is undoubtedly useful.

Foreign News

A New Canning Plant in Russia

IT HAS been decided to build in Kherson a new, large vegetable canning factory with an annual capacity of 5,000,000 cans. Part of the production of this factory is to be exported to Europe and to Near Eastern countries.

Market for Colourings for Foodstuffs in France

Although the French Governmental Regulations permit the use of a wide range of colourings in many foodstuffs and drinks, extensive use of these colourings is limited principally to wines, liqueurs, and other alcoholic beverages, and to a few vegetable products, such as tomatoes, and certain jams. The two principal colours employed are carmine, to deepen the natural colour of tomatoes, and sulphate of copper, to retain the green colour of certain vegetables and fruits, although this latter practice is not usually employed by most canners, except upon special orders. In using sulphate of copper for such purposes, it is so regulated that the proportions must not exceed 45·4 milligrams of copper per pound of the drained fruits or vegetables. French canners have tested chlorophyl from spinach for heightening the colour of peas and beans, but so far these efforts appear to have been unsatisfactory, and no headway has been made in its use in France. In the manufacture of jams, the principal colouring material used is carmine, although this in no great quantity. Its use in strawberry preserves is becoming increasingly important.

Removal of Excess Duty on New Zealand Milk Powder in Germany

As a result of protracted negotiations, the New Zealand Government has completed satisfactory tariff arrangements with Germany, which will result in the removal of the excess duty of £17 a ton imposed on New Zealand milk powder as a counterblast to the previous action of the Government in penalising the importation of German goods into New Zealand, according to a report for December from American Trade Commissioner Julian B. Foster at Wellington, New Zealand.

Prior to the imposition of this excess duty, which amounted to about four cents a pound higher than that paid by any of New Zealand's competitors in other countries, the Dominion succeeded in building up a highly satisfactory market for skim milk powder in Germany. Sales had amounted to from 800 to 1,000 tons annually, and although it is about two years ago since this trade was lost, it is considered that the German market will prove a very valuable outlet for any surplus powder which New Zealand is unable to dispose of profitably in Great Britain.

The Italian Fruit and Vegetable Canning Industry

The canning and preserving of fruits and vegetables was first introduced in Italy some fifty years ago, when a small factory was opened in Turin. Since then it has spread throughout the country, dealing with an ever-increasing number of products.

At the end of 1926 nearly 600 factories were engaged in the preparation of canned and preserved foods. The Provinces of Naples (146 factories), Emilia (144), and Sicily (121) are the chief centres of this industry. Other canneries are scattered over the Peninsula, more especially in Lombardy, Piedmont, Liguria, Tuscany, and Apulia. A capital of over one thousand million lire is invested in this industry.

A large export trade is done in canned and preserved fruit and vegetables.

Dutch Margarine Trust buys Swedish Factory

The Nya Margarine Aktiebolaget Svea, Kalmar, Sweden, has been sold to the large Dutch margarine trust—Jürgens-Van den Bergh—which controls about 75 per cent. of the German margarine production and owns a number of factories in Holland, Czechoslovakia, France, England, Denmark, and Norway. This is not the first connection, however, between the trust and the Swedish margarine industry, the trust for a long time having had considerable capital in two other Swedish companies, the Agra and the Sundbyberg margarine factories. The capital invested by the trust in the Aktiebolaget Svea is estimated at about 7 million kroner.

New Condensed Milk Factory in Czechoslovakia

The first new machines for the manufacture of condensed milk were delivered recently and put into operation in the new Central Agricultural Dairy in Brno. It is stated that these machines are able to condense or dry 500 quarts of milk an hour. The milk is sprayed into a heated cylinder where the water evaporates and leaves a fine white powder.

Import Certificates required for Plum Puddings in Canada

Importations of plum pudding require a certificate to the effect that the meat used in its manufacture was purchased from establishments operating under national inspection in the country of origin, and that it was found by the inspectors to be sound, wholesome, and fit for food, according to information published in the January 21 issue of the *Canada Gazette*. The certificate must furnish a description of the product and indicate the number and weight of packages. The certificate required for plum pudding is similar to that in use for pork and beans and mince meat.

Chilean Tariff Increase on Powdered Milk

As a result of the tariff revisions recently approved by the Chilean Joint Congressional Tariff Commission, the duty on powdered milk will be raised from 1·80 pesos per grass kilo to 4 pesos.

Canned Fruits and Vegetables Market in Bombay

There is a fairly large market in Bombay for canned fruits, while canned vegetables enjoy only a comparatively small trade, according to information contained in a recent letter to the trade from the American Consul at Bombay. The market in canned provisions is dependent to a large extent on the European community, the Parsees, and a few wealthy Indians. The masses of the Indian people are unable to purchase canned fruits, or other imported provisions, on account of limited earnings. Apart from their inability to pay for imported provisions, there are certain religious prejudices which prevent orthodox Hindus from eating canned fruits. The abundance of fresh fruits and vegetables available in Bombay and the outlying districts during all seasons of the year adversely affects the sale of such imported products. The want of adequate facilities for preservation and transport, however, is a hindrance to the distribution and consumption of fresh produce grown in India, and hence the cities and boroughs of the coastal strip, and also a few interior localities, offer a fair market for imported fruits and vegetables.

Canned and bottled provisions are sold in large quantities to military canteens for the use of the British soldiers, and in nearly all cases they buy only medium-quality products, on account of cheaper prices. This condition may be said to be true also of the general public in India, where price and not quality is the chief factor in the sale of almost all kinds of merchandise.

The most popular of the canned fruits, listed in the order of prominence, are peaches, plums, pineapples, apricots, and cherries.

American packed fruits are having a large sale, though Australian fruits, by reason of cheapness, are keen competitors. However, according to wholesale dealers, California fruits are becoming more and more popular, despite their higher prices. The United States accounts for nearly two-thirds of the total imports of canned fruits into Bombay. The remainder comes chiefly from Great Britain, Tasmania, and the Straits Settlements, in almost equal proportions.

Gathering Sap in a Canadian Maple Bush: Gravity System.

(*See Notice on page* 308.)

Since no separate statistics are available with regard to the imports of canned vegetables, it is not possible to gauge the extent of the market for those products. As already stated, however, Bombay offers only a small market for them.

Though at the present time of all lines of business the provisions trade shows the greatest activity in Bombay, the prevailing competition on the market will render the introduction of new brands very difficult, unless quality and price are in their favour. Price is the most essential factor, and quality counts only as a secondary objective.

Condensed and Evaporated Milk in Egypt

Evaporated and condensed milks are almost exclusively used by European colonies in this country, according to a report of October 28 from American Vice-Consul Joseph I. Touchette at Alexandria. The natives very rarely use this type of milk unless prescribed by a physician. Holland and Switzerland export the largest amount of evaporated and condensed milk to Egypt. These two countries have a firm foothold upon this market. Other countries sell similar products with great difficulty.

There is given below a table showing the valuation of imports of evaporated and condensed milk into Egypt from 1921 to 1926, inclusive:

	Evaporated Milk Dollars	Condensed Milk Dollars
1921	10,785	256,834
1922	7,924	464,726
1923	33,351	228,964
1924	10,514	256,468
1925	11,241	155,960
1926	9,758	167,186

Retail prices for canned milks vary between 15 and 25 cents per tin, according to brand.

No evaporated and condensed milk is produced in Egypt. Consequently, the market in this country for this particular merchandise may be properly gauged by the actual importations.

Imports of condensed milk have greatly fallen. This fact may be attributed to a changing policy among the consuming public which to-day seems to absorb more and more fresh milk to the detriment of the condensed varieties. Several local firms have, during the last few years, opened pasteurising and sterilising milk stations which seem to meet with favour, particularly among hospitals, maternity homes, and people raising growing children. The most important of these firms, although yet small, is that of the Baudrot Laboratoire d'Homegeneisation of 9, rue Ishak el Nadim, Alexandria.

It is stated that special discounts are given to retailers purchasing large quantities and that credit amounting to from three to four months is usually granted.

One of the larger Swiss companies maintains a branch office in Alexandria. This agency is at all times kept well supplied with all of the varieties of milk offered for sale. Thus, prompt delivery may be made and credits closely watched by the manager in charge of the branch office. Retailers are not obliged to maintain large stocks and consequently do not tie up a large amount of their capital in this commodity.

Another large Dutch company is represented by an agency in Alexandria. Milk is sent on consignment to this agency, which settles its accounts regularly at definite intervals as the stocks are sold. It offers to the retailers the same services as the Swiss firm

Both concerns carry on an extensive advertising campaign in the daily newspapers, on bill boards, and in electric cars.

During 1921, the United States controlled approximately 25 per cent. of the Egyptian market, which has since been almost totally lost. The above two mentioned concerns have practically an absolute monopoly of this field.

Production of Canned and Powdered Milk in Switzerland

A decided change has occurred in the condensed milk industry in the Canton of Berne, according to a report of November 3 received from American Consul Donald R. Heath at Berne, Switzerland. The Berne Milk Co. has shut down, due to financial difficulties. This firm, in which French capital is supposed to be heavily invested, has been in financial difficulties for some time, and was forced to close down by the action of the Swiss Association of Milk Producers, who refused to deliver any more milk to the concern, which was in debt to the association to the reported sum of nearly $39,000. This concern had a contract with the association for 10,000 litres of milk a day (one litre equals 1·05 quarts).

The closing down of this concern does not mean a decrease in the production of canned milk in this district. The Bernese Alps Milk Co. has contracted for a period of eight years with the Milk Producers Association for the milk formerly supplied to the Berne Milk Co. Inasmuch as the association is the only source of milk in quantity in this district, its action in contracting this supply to the Bernese Alps Milk Co. means that it will be impossible for the Berne Milk Co. to reopen in this part of Switzerland.

The Bernese Alps Milk Co. will now manufacture 60,000 litres of milk a day, the greater part of this amount being converted into canned sterilised milk.

The Bernese Alps Milk Co. is understood to be the only milk factory in Switzerland manufacturing sterilised milk. The Nestlé concern produces a brand of sterilised milk, but this is made in one of its factories in Norway.

Restrictions on Imports of Milk into Ceylon

Effective August 23, 1927, the importation into Ceylon of milk which contains less than 12 per cent. of milk solids, including less than 3·5 per cent. of milk fat; milk, whether condensed or dried, which is not labelled with instructions as to dilution; milk, whether condensed or dried, which, when diluted in accordance with the instructions on its label or container, produces a fluid which contains less than 12·4 per cent. of milk solids, including less than 3·6 per cent. of milk fat, is prohibited. Dried milk, however, may be imported for purposes of manufacture under licence from the Principal Collector of Customs.

Enquiries

The following are extracts from letters we have lately received. We shall be glad to put interested parties in touch with the writers, or to insert replies in the Correspondence columns.

* * *

12. A correspondent wishes to have the name of a reliable manufacturer of Sausage Filling Machinery.

* * *

13. "We have recently been making enquiries how to treat wheat embryo or germ at a temperature not exceeding 80° Centigrade so as to remove all rancid taste, or, alternatively, how to treat it immediately after milling to prevent the formation of the rancid taste. So far we have not received the information which we want."

* * *

14. "We shall be obliged for the name or names of a firm or firms supplying glass containers for cooked meats."

* * *

15. "We shall be glad to know of any specially good Agency in the food line, as we have a considerable staff of travellers and might be prepared to take this up provided the Agency is a good one."

* * *

16. "In addition to the above, we are wishing to locate a firm who are able to supply us with a small powder mixer; if you have the address of any manufacturer or agent we should be obliged if you would let us have it. The machine we require is an exceedingly small one, its capacity being only a matter of three to four pounds of a farinaceous product."

* * *

17. Required, the name of a firm who supply an efficient Potato Cutting Machine for the manufacture of Potato Crisps.

* * *

18. "I am requiring a machine for crushing and moulding ordinary cheese into a paste, for preference one which will blend two different cheeses together, previous to passing the paste through pasteurisation kettles. I also require a machine for moulding the pasteurised cheese paste into small 1 oz. and 2 oz. tablets and tight wrapping them in silver or waxed papers similar to the several brands already on the market. At present I have only a small output demand, and therefore prefer hand-worked machines, although at a future date I hope to invest in power machinery. I am also interested in machinery and boiling pans for the making of potted meat and fish pastes, etc."

* * *

19. "We are desirous of getting in touch with purchasers of Tea Wastes, used for the manufacture of Caffeine, and would be obliged if you could introduce us to a likely house, either British or Continental."

* * *

20. Required, makers or suppliers of Pectin.

21. "We are making a form of Meat Extract which is to be evaporated down to a paste, and are finding great difficulty with frothing. Can you give us any advice how to overcome frothing under vacuum?"

* * *

22. "We would like to have an analysis of albumin or white of egg. What part does globulin play in the building up of the chicken—as regards bone-forming and flesh-forming properties? As you know, albumin is a very complex substance; its chief constituents are ovalbumin, ovoylobulin, conalbumin, and globulin. Ovalbumin is the chief protein, and coagulates at 60° C., whereas all the others do not until the temperature reaches 72° C. They are all soluble except globulin, and this can be precipitated from albumin by ammonium sulphate."

* * *

23. "We are South African manufacturers—on a large scale—of Lemon and Orange Squashes, and as we cannot get fruit all the year round, we take as much as we can during the season. These we squeeze and then store the raw juice—free from seeds and coarse pulp—in vats of 500 gallon to 2,000 gallon capacity, adding SO_2 as a preservative. This ensures against fermentation, but if the juice remains in the vats longer than six weeks—and much less than that during the hot summer—the juice becomes covered with a white film, though every precaution is taken to exclude air from the vat. Then gradually, if not removed, this white film assumes the appearance of velvet of an almost dark blue colour and attains a thickness of a quarter of an inch; at the same time it imparts a stale taste to the juice. I have used salicylic acid in conjunction with SO_2, but the result was the same as without salicylic acid. I have taken all precautions as to cleanliness from the time the fruit gets into the factory; it is washed well. Likewise the squeezing machines and the pulper get washed well with hot water before we start in the morning, also in the evening after we finish squeezing. Before I start filling a vat with juice, I have it sterilized well with live steam and then we may leave it for a day with hot water before it gets the juice. I have also thought that our complaint may arise from the vat wood, so last year we went to the expense of a couple of hundred pounds in coating the vats with shellac, but the result is the same. In your opinion, what is the cause of it? and what preservative should we use to stop it? Before I finish I would like your advice on this subject also: We are intending exporting raw juice; what would be the best casks for such? What sort of casks do they use for the juice sent from Italy to England? Any advice that you may have to offer shall be much appreciated.

* * *

24. "We are open to appoint wholesale agents at home and abroad. Merchants with a connection amongst bakers and confectioners desired."

25. "Could you inform us whether there is a book published dealing with the manufacture of sauces, pickles, preserves, etc.?"

* * *

26. "Could you oblige us with particulars relating to the method of carrying out an analysis of dried milk?"

Replies to Enquiries

The following replies are of general interest to readers.

* * *

5 and 6 (*March*, p. 298). "We have recently made an analysis of a Piping Jelly and have found the following ingredients are contained therein:

Water	34	per cent.
Glucose	34	..
Cane Sugar	20	..
Pectin	8	..
Acid (as tartaric) ...	1	..

"The information above may not be sufficient for your correspondent, but it will no doubt start him on the right lines."—*H. Drake-Law.*

* * *

7 (*March*, p. 299). "Query No. 7 given on page 299 of the March number of your Journal raises some interesting points. Your correspondent apparently wishes to use tragacanth in place of eggs, citric acid for lemon juice, acetic acid for vinegar, and dried milk for fresh. It would appear that the excellence of the product, for which your correspondent longs, will be one of appearance rather than composition. You print on page 282 of the same issue other suggestions for the same product, which immediately invite those comparisons which have, and for doubtless good reasons, been described of old as odious.—*G. D. Elsdon.*

* * *

8 (*March*, p. 299). "The pectin contents of fruit are precipitated with acetone by the method with which your correspondent is evidently familiar. The filtration and drying present no great difficulty. An ordinary filter paper gives quite satisfactory results, and the drying is carried out in a steam-heated oven in the usual manner. The results are not always reliable, as other ingredients are liable to be precipitated with the pectin. If your correspondent has any further difficulties we shall be glad to put him in direct touch with our chief chemist, or give him any information he requires if he will write to us.

"The most reliable means of estimating H ions is by the electrometric method. An apparatus of this type is described on page 289 of your March issue. This could be fitted up at small cost in a less elaborate manner than that described. We have had two of these plants constructed, and we shall be pleased to show them to your correspondent or give him further information.

"There is a second method of testing for H ions—that is, by the use of indicators, but the colour of the jam or marmalade then seriously interferes with the end reaction and the results are not as reliable as in the previous test."—*H. Drake-Law.*

9 (*March*, p. 299). "The trouble experienced by your correspondent with his Cokernut Jelly arises probably out of the gelatine used. This material is invariably impregnated with mould spores, especially the batches which are made during the summer months. The best gelatine to use from this point of view is that made in the winter months and is known as the "winter pack." The mould spores are then much less numerous and less active.

"We can suggest two or three simple means of overcoming the trouble:

"1. The simplest method would be to boil for a longer period in order completely to destroy the mould spores.

"2. The second expedient would be to substitute Japanese Isinglass for the ordinary gelatine. This is not subject to the attack of moulds. It is more expensive, but has a much higher setting power than gelatine, and might alter the character of the confection.

"3. A third method would be to stove the finished goods in the drying shed in the manner adopted for the treatment of gums and similar products.

"We should be in a better position to advise your correspondent if he would send us a sample of the affected goods."—*H. Drake-Law.*

* * *

9 (*March*, p. 299). "The correspondent in question should be able to avoid the mould on the jelly cube by adding the tartaric acid as late as possible in the process, after the boiling has been completed. Our representatives would be able to give him more helpful information."—*A. Boake, Roberts and Co., Ltd.*

* * *

22 (*Present Issue*). "The shell supplies most of the material for bone-formation. There is good evidence for thinking that egg-white contains little or no globulin; the so-called globulin fraction consists of a mixture of ovalbumin and conalbumin with ovomucoid and ovomucin. The chemistry and biochemistry of egg-white are still in a very incomplete state; perhaps the following notes may help your correspondent:

"White of egg is made up of a pale yellow fluid contained in a network of a fibrinous material, which is broken up by beating the egg. Egg-white is obtained by straining this material (beaten) through calico. It is faintly alkaline to litmus, has a specific gravity of about 1·045, contains about 13·3 per cent. of solid matter, 85 to 88 per cent. of water. Protein accounts for 12·2 per cent., glucose for 0·5 per cent., ash for 0·66 per cent., and there are traces of fat and cholesterol. In 100 parts of protein there are 6·7 parts of globulin, 10 parts of ovomucid (also called ovomucin), and the rest is albumin. Crystalline egg albumin is moderately easy to obtain, but the *whole* of the albumin has never been crystallised. The non-crystallisable fraction is called conalbumin.

"The coagulation points of proteins have no precise significance at the moment. Solubilities, too, may have little or no relation to the way in which various proteins are utilised. It must be remembered that the chick (before it leaves the shell) has a digestive system capable of dealing with proteins. Proteins in the course of digestion are broken down to amino acids before being used.—*E. H. Callow*

Commercial and Legal News

(The Editor does not accept responsibility for any errors which may occur in the following notices.)

London Gazette Information

Merchandise Marks Act:

Imported Eggs in Shell and Dried Eggs.

Further applications for an Order in Council under the above-mentioned Act, to require the marking of imported eggs in shell and receptacles containing dried eggs, have been referred for inquiry to the Standing Committee set up under the Act by the Minister of Agriculture and Fisheries, the Secretary of State for the Home Department, and the Secretary of State for Scotland, acting jointly.

Under the provisions of the Act, while the Committee in every case referred to them must consider whether the goods should bear the indication of origin at the time of sale or exposure for sale, they may also, at their discretion, consider and report upon the question whether such goods should bear an indication of origin at the time of importation.

The date of the Inquiry in this case will be announced later. Any communication with regard to the matter should, however, be addressed, as early as possible, to Mr. H. J. Johns, the Secretary of the Standing Committee, 10, Whitehall Place, London, S.W.1.

TRADE BOARDS ACT, 1909 AND 1918.

NOTICE OF INTENTION UNDER THE ABOVE-MENTIONED ACTS TO MAKE A SPECIAL ORDER TO BE CITED AS THE TRADE BOARDS (MILK DISTRIBUTIVE) ORDER, 1928.

Whereas the Minister of Labour (hereinafter referred to as "the Minister") has withdrawn the draft Special Order referred to in the Notice of Intention dated 30th July, 1927;

And whereas the Minister intends to make a Special Order with a view to altering the description of the Milk Distributive trade contained in the Appendix to the Trade Boards (Milk Distributive) Order, 1920, as varied by the Trade Boards (Milk Distributive) Order, 1926.

Now therefore the Minister hereby gives notice that he intends, pursuant to the powers conferred on him by Section 2 of the Trade Boards Act, 1918, to make a Special Order varying the above Orders in the manner shown in the draft Special Order contained in the Appendix hereto.

Further copies of the draft Special Order may be obtained on application in writing to the Secretary, Ministry of Labour, Whitehall, London, S.W.1.

Objections to the draft Special Order must be sent so as to reach the Minister of Labour at the above address within 50 days from the second day of March, 1928. Every objection must be in writing and must state (*a*) the specific grounds of objection and (*b*) the omissions, additions, or modifications asked for.

DRAFT SPECIAL ORDER.

TRADE BOARDS.

THE TRADE BOARDS (MILK DISTRIBUTIVE) ORDER, 1928, SPECIAL ORDER DATED , 1928, MADE BY THE MINISTER OF LABOUR UNDER SECTION 2 OF THE TRADE BOARDS ACT, 1918 (8 AND 9 GEO. 5. C. 32) VARYING THE TRADE BOARDS (MILK DISTRIBUTIVE) ORDERS, 1920 AND 1926.

Whereas the Minister of Labour (hereinafter referred to as the Minister) by a Special Order called the Trade Boards (Milk Distributive) Order, 1920, dated the 9th day of January, 1920, applied the Trade Boards Acts, 1909 and 1918, to the trade specified in the Appendix to the said Special Order;

And whereas the description of the trade in the said Appendix was altered by the Trade Boards (Milk Distributive) Order, 1926;

And whereas it is provided by sub-section 1 of section 2 of the Trade Boards Act, 1918, that every Special Order may be varied or revoked by a subsequent Special Order;

And whereas the Minister is of opinion that it is desirable to vary the said Special Orders by altering the description of the trade therein specified;

Now, therefore, the Minister, by virtue of the powers conferred on him by the Trade Boards Acts, 1909 and 1918, and of any other powers enabling him in that behalf, hereby makes a Special Order varying the said Special Orders:

(1) The description of the trade set out in the Appendix to this Order shall be substituted for that set out in the Appendix to the Trade Boards (Milk Distributive) Order, 1920, as altered by the Trade Boards (Milk Distributive) Order, 1926.

(2) This Order may be cited as the Trade Boards (Milk Distributive) Order, 1928.

Given under the Official Seal of the Minister of Labour this day of , in the year one thousand nine hundred and twenty-eight.

Secretary of the Ministry of Labour.

APPENDIX

1. Subject as hereinafter provided, the Milk Distributive Trade shall consist of the following operations:

(i) the wholesale and retail sale of milk;

(ii) the sale of other goods by workers mainly employed in the sale specified in paragraph 1 (i) hereof;

(iii) all work incidental to the sale specified in paragraph 1 (i) hereof.

2. Work incidental to the sale specified in paragraph 1 (i) hereof shall include, inter alia:

(*a*) collecting, delivering, despatching;

(*b*) pasteurising, sterilising, homogenising, humanising, cooling, separating and all work performed in connection with any other process in the preparation of milk;

(*c*) blending, testing, and sampling of milk;

(*d*) cleaning of utensils, receptacles, vehicles, premises, plant, machinery;

(*e*) stoking, attending to boiler, plant or machinery, fire lighting, portering of coal or other fuel;

(*f*) horse keeping and harness cleaning;

(*g*) portering, lift or hoist-operating, time-keeping, storing, stock-keeping, warehousing;

(*h*) boxing, parcelling, labelling, weighing, measuring, checking, bottling, packing and unpacking;

(*i*) clerical work or canvassing carried on in conjunction with the work specified in paragraph 1 hereof.

3. Notwithstanding any of the foregoing provisions, the Milk Distributive Trade shall not include any of the following operations:

(*a*) the wholesale sale of milk (and operations incidental thereto) from an establishment at which milk products are manufactured and from which unseparated milk is not ordinarily sold as such;

(*b*) the wholesale sale of milk direct from the farm where the milk was produced and all operations incidental thereto;

(*c*) the sale of milk in restaurants, shops, or similar premises by waiters or shop assistants who are not mainly engaged upon such sale;

(*d*) the transport of goods by common carriers;

(*e*) carting and operations incidental thereto where the business carried on consists exclusively of such operations;

(*f*) work done by or on behalf of the Post Office.

4. For the purpose of this Schedule the expression "milk" means milk other than dried or condensed milk.

(DRAFT) EXPLANATORY MEMORANDUM. TRADE BOARDS (MILK DISTRIBUTIVE) ORDER, 1928.

Purpose of Memorandum.

1. The following memorandum is issued for the guidance of all concerned in the application of the Trade Boards (Milk Distributive) Order, 1928; it must, however, be understood that an authoritative interpretation of the Trade Boards Acts and of Orders made thereunder can be given only in the Courts of Law. The Minister's responsibility is confined to securing compliance with the Trade Boards Acts in cases in which he is advised that the Acts have not been complied with.

General Effect of Amendment of Order.

2. *General.*—The Milk Distributive Order of 1928 which amends the Milk Distributive Orders of 1920 and 1926, makes no substantial change in the kind of establishment included within the scope of the Milk Distributive trade, but lays down a definition of that trade which is clearer than the definition contained in the earlier Orders. Experience has shown that the trade impinges on other trades or branches of trades which, though they were not intended to be covered by the original Order, were nevertheless not excluded with sufficient precision. In particular the words used in the first paragraph of the Order of 1920 have given rise to difficulties of interpretation.

3. *Inclusions.*—The first paragraph of the Amending Order brings in without qualification all the wholesale and retail sale of milk, together with the sale of other goods by workers mainly employed upon the sale of milk (Section 1 (i) and (ii)). It also includes all work incidental to the sale of milk (Section 1 (iii)).

4. *Incidental Operations.*—Paragraph 2 enumerates the principal types of work which are incidental to the sales mentioned in paragraph 1 (i) and has the same general effect as the similar paragraph in the original Order.

5. *Clerical Work.*—The inclusion of clerical work and canvassing carried on in connection with the sale of milk is in the same terms as in the original Order, that is to say, that it is included when carried on as incidental to and in conjunction with the sale of milk wholesale or retail (paragraph 2 (i)).

6. *Employees of Farmers.*—The Minister has been advised that the Trade Boards Acts do not apply to workers who are employed in agriculture and consequently the minimum rates fixed by Trade Boards are not enforceable in respect of them. He is advised, however, that certain workers employed by farmers upon work connected with milk distribution are not employed in agriculture but by reason of their status and occupation as milk workers are entitled to be paid the minimum rates of wages fixed by the Milk Distributive Trade Board.

As at present advised the Minister will confine his action in requiring farmers to pay Milk Distributive Trade Board rates to cases of workers who are employed in connection with the *retail* sale of milk and who fall within the following classes:

(1) Workers who are employed exclusively upon one or more of the operations included in the Order defining the Milk Distributive Trade (this work is described below as "milk work"). Examples of such workers are:

(*a*) a worker employed exclusively on a milk round;

(*b*) a worker employed exclusively upon "milk work" in or about the dairy or on any other "milk work";

(*c*) a worker employed for part of his time on a milk round and for the rest of his time on other milk work.

(2) Workers employed on milk work but who are also employed upon other work so long as such other work does not form a substantial element of their employment. Examples of such workers are:

(*a*) a worker employed on milk work for 48 hours in the week and also employed on other work in additional hours;

(*b*) a worker employed, during the week, on

milk work for all but a very small proportion of his time and doing other work during that time.

7. *Exclusions.*—Paragraph 3 of the Amending Order indicates certain classes of work which are to be *excluded.*

(*a*) *Milk Product Factories.*—By paragraph 3 (*a*) the wholesale sale of milk is excluded from the Amending Order, when carried on from establishments such as creameries or cheese factories, in which milk is ordinarily used as a material for manufacture and is not ordinarily sold as milk. The intention is to exclude the occasional wholesale sale of milk by creameries, etc., but to include such sale when carried out as a regular part of the business—*e.g.*, during the whole or the greater part of the year.

(*b*) By paragraph 3 (*b*) the wholesale sale of milk direct from the farm where it is produced is excluded in all circumstances. Thus a worker who is employed exclusively upon the wholesale sale of milk is not covered by the Amending Order.

(*c*) *Shops and Restaurants.*—By paragraph 3 (*c*) shop assistants, waiters, etc., are excluded if they are mainly engaged in shops, restaurants, or the like, in selling articles other than milk. But a person employed in the delivery of milk on a milk round (*i.e.*, outside the shop) is included for such work even though employed for a larger number of hours in the day as a shop assistant or waiter. Further, a shop assistant, who is employed mainly in the sale of milk is, by virtue of section 1 (ii) of the Order, included for all the time he acts as a shop assistant.

8. *Transport.*—The transport of goods by common carriers such as Messrs. Carter Paterson, or by railways, is not regarded as part of the Milk Distributive Trade.

9. *Meaning of "Milk."*—Milk is defined as milk other than dried or condensed milk.

Reduction of Capital.

In the matter of Crosse and Blackwell, Ltd., and reduced, and in the matter of the Companies (Consolidation) Act, 1908. The Order of the High Court of Justice, Chancery Division, dated February 8, 1928, confirming the reduction of the capital of this company from £10,000,000 to £9,767,766 12s. and the minute approved by the Court, showing with respect to the share capital of the company as altered the several particulars required by the Act, were registered by the Registrar of Companies on February 27, 1928.

Voluntary Liquidations.

(Note.—Voluntary liquidations may, in some instances, refer to companies in course of reconstruction.)

J. B. Sausage and Food Manufacturers, Ltd. Resolved, March 1, that the company cannot, by reason of its liabilities, continue its business, and that it be wound up voluntarily. Mr. R. Aston has been appointed liquidator.

Associated Isinglass Manufacturers, Ltd. Resolved, February 27:

1. That it is desirable to reconstruct the company, and accordingly that the company be wound up voluntarily, and that Reginald Severne Ford, of Audrey House, Ely Place, Holborn, E.C.1, and Francis John Higgin, of 6, Devonshire Square, E.C.2, be and they are hereby appointed liquidators for the purposes of such winding-up.

2. That the said liquidators be and they are hereby authorised to consent to the registration of a new company, to be named "Isinglass Manufacturers, Limited," or by some other name as nearly similar thereto as can be arranged, with a Memorandum and Articles of Association in the form of the draft which has been already prepared with the privity and approval of the Directors of the Company, subject to any modifications which they may deem necessary or expedient.

3. That the draft Agreement submitted to this meeting and expressed to be made between the company and its liquidators of the one part and Isinglass Manufacturers, Limited, of the other part, be and it is hereby approved, and that the said liquidators be authorised, pursuant to section 192 of the Companies (Consolidation) Act, 1908, to enter into an agreement with such new company (when incorporated) in the terms of the said draft, and to carry the same into effect with such (if any) modifications as they may think expedient.

Meals by Motor, Ltd. Resolved, March 5, that the company cannot, by reason of its liabilities, continue its business, and that Mr. S. W. Marshall, 107a, Mortimer Street, Herne Bay, be appointed liquidator. Claims should be sent to the liquidator by April 26.

John Thompson and Sons (Opmus Flour), Ltd. Resolved, March 5, that the company cannot, by reason of its liabilities, continue its business, and that it be wound up voluntarily, and that Mr. R. F. Helm, C.A., National Provincial Bank Chambers, Market Place, Boston, be appointed liquidator. Claims should be sent to the liquidator by April 23.

Claims Against Estate.

Re John James Sainsbury, deceased, late of "Bishopsfield," Broadlands Road, Highgate, Middlesex, and of "Broadlands," Little Wratting, Suffolk, and of Stamford House, Stamford Street, Blackfriars, London.

Notice is hereby given, that all persons having claims against the estate of the above deceased (who died on January 3, 1928, and whose will and codicil were proved at the Principal Probate Registry on February 13, 1928, by John Benjamin Sainsbury, Arthur Sainsbury, Paul James Sainsbury, and Leonard Tubbs, four of the executors named in the said will and codicil), are hereby required to send particulars of their claims to the undersigned, by May 1, 1928, after which date the executors will proceed to distribute the assets of the deceased, having regard only to the claims of which they shall then have had notice.

Leonard Tubbs and Co., Moorgate Station Chambers, London, E.C.2, solicitors for the said executors.

The following are taken from reports, but we cannot be responsible for any errors that may occur.

Potato Crisps

The Court of Appeal, consisting of the Master of the Rolls and Lords Justices Sargant and Lawrence, heard, on February 21, an appeal by Smith's Potato Crisps, Ltd., of Crown Works, Cricklewood, from a judgment of Mr. Justice Eve dismissing a passing-off action by them against Paige's Potato Crisps, of Crown Works, Holland Road, Brixton. Appellants complained of the refusal of Mr. Justice Eve to grant an injunction restraining defendants from passing-off their potato crisps by imitating the tins and the bags in which appellants' crisps were packed and sold. Mr. Justice Eve held that there was no deception or likelihood of deception. On appeal, Sir Duncan Kerly, K.C., on behalf of Smith's, submitted that the twopenny bags in which Paige's crisps were sold were calculated to deceive and had led purchasers to believe that they were getting Smith's crisps.

Mr. Whitehead, K.C., for respondents, said that not only had Smith's failed to make out fraud, but Paige's disproved it. The Judge was right in holding that there was nothing in the packing or bags calculated to deceive a purchaser.

The Master of the Rolls, giving judgment, said the potato crisp business was a new one, and must be profitable. Appellants were the largest makers in the business. In the busy season they sold about a million and three-quarter bags a week. So far as the appeal was concerned appellants had to jettison a great part of the case they sought to make before Mr. Justice Eve. Greatest stress was laid on the twopenny bags in which the crisps were sold. He thought the bags of the defendants were clearly distinguishable from the bags of the appealing plaintiffs, and the appeal must be dismissed.

Lords Justices Sargant and Lawrence concurred.

Dismissal

After a four days' hearing in the King's Bench Division, before Mr. Justice Avory and a special jury, judgment was given, on March 7, in an action in which Mr. Harold Edgar Palmer, of Addiscombe Road, Croydon, claimed damages for the alleged breach of his service agreement from Messrs. W. Weddell and Co., Ltd., of West Smithfield.

The allegation was that Mr. Palmer was dismissed when he still had nearly three and a half years of his agreement with the firm to run. His appointment was that of assistant manager of the canned goods department and manager of the dried fruit department, at a salary of £1,000 a year.

Defendants maintained that they were justified in dismissing him because of his insubordination and misconduct.

Sir Henry Maddocks, K.C., who appeared for Mr. Palmer, argued that that could not be relied upon as a defence, because even if the allegations were correct, defendants had clearly condoned the conduct.

As a matter of fact, he said, Mr. Palmer had called the manager of the canned goods department, whose name was Eastaff, a liar, but Mr. Eastaff had first called him a "slaughterer." This term implied that plaintiff was making sales of the Company's stocks at bad prices. Plaintiff's claim was that had his advice been followed, losses on excessive stock which Mr. Eastaff had bought could have been avoided. It was in this way that the differences between plaintiff and Mr. Eastaff got to the notice of those in authority and led eventually to plaintiff's dismissal. He also complained that his contract as a manager had not been carried out, as he had been sent to visit customers in the country on exactly the same basis as an ordinary commercial traveller.

After plaintiff had given evidence and called witnesses in support of the latter contention, defendants called a number of witnesses who said that it was quite a part of an assistant manager's duties to go out into the country to get to know the customers as Mr. Palmer had been asked to do.

Sir Edmund Vestey, a director of the Union Cold Storage Co., with which Messrs. Weddell and Co. are associated, said that in an interview he had with Mr. Palmer he offered to pay him a lump sum to terminate the contract, or alternatively to permit him to look for another job and pay him, when he got one, the difference between the salary he would receive and what he would have received had he remained for the rest of the contract with Weddell and Co. Mr. Palmer replied by claiming every penny under the contract. Sir Edmund said he did not consider that was a fair and businesslike proposition.

The jury returned a verdict for plaintiff for the full amount of the damages claimed—£3,583 6s. 8d.

Mr. J. W. Cassells, K.C., for defendants, asked for a stay of execution on the ground that the amount of the damages was excessive, but his Lordship refused the application, and judgment was entered for plaintiff, with costs.

(Continued from page 327.)

GOLDSBOROUGH CONFECTIONS, LIMITED. (228067) Regd. Feb. 11, 1928. To take over the bus. of mnfg. confectioners and mchts. cd. on by W. A. Thompson and C. Waterhouse. Nom. Cap.: £1,000 in 800 pref. shares of £1 and 4,000 deferred ord. shares.

IXWORTH CYDER COMPANY, LIMITED. (228107) Regd. Feb. 16, 1928. To take over the bus. cd. on at Ixworth, Suffolk, and elsewhere, as "Crown Cyder Company" by A. and E. Hunter, Ltd., and Greene, King and Sons, Ltd. Nom. Cap.: £5,000 in £1 shares.

RICHARD WARBURTON AND SONS, LIMITED. (228083) Regd. Feb. 15, 1928. 120, Millgate, Wigan. To take over the bus. of mineral water mnfrs. and bottlers cd. on at 120, Millgate, and 120, Back Millgate, Wigan, as "The Palatine Mineral Waters and Bottling Co." Nom. Cap.: £5,000 in £1 shares (1 founders').

W. H. CLARKE (1928), LIMITED. (228120) Regd. Feb. 16, 1928. To mnfre., import, export, and deal in fruit and jams, etc. Nom. Cap.: £3,000 in £1 shares (1,500 pref. and 1,500 ord.).

New Companies

The undermentioned particulars of New Companies recently registered are taken from the Daily Register compiled by Jordan and Sons, Ltd., Company Registration Agents, 116-118, Chancery Lane, London, W.C.2.

Oak Farmhouse Dairy, Limited. (228479) Regd. Mar. 1, 1928. The Oak Farmhouse, Mapleton, nr. Edenbridge, Kent. To take over the bus. now cd. on at 55, High Street, Sevenoaks, Kent, and elsewhere, as "The Oak Farmhouse Dairy." Nom. Cap.: £2,000 in £1 shares.

Newport County Supply Stores, Limited. (228478) Regd. Mar. 1, 1928. To carry on the bus. of grocers, provn. mchts., bakers, and confectioners, etc. Nom. Cap.: £3,000 in £1 shares.

Euan Thomas, Limited. (228464) Regd. Mar. 1, 1928. 2a, Park Avenue, Mitcham, Surrey. To take over the bus. of a grocer and provn. dlr. now cd. on at Mitcham, Balham, Tooting Common, Thornton Heath, Clapham, Streatham, Wandsworth Common, and elsewhere, as "Euan Thomas," "Coopers Stores," "Penwyns Stores," and "Palmers Stores." Nom. Cap.: £10,000 in £1 shares.

C. W. Kitto, Limited. (228423) Regd. Feb. 29, 1928. Grays, High Street, Harlington. To take over the bus. of mnfrs. and sellers of and dlrs. in aerated beverages and mineral waters cd. on at Harlington as C. W. Kitto and Co. Nom. Cap.: £1,500 in £1 shares.

County Creameries, Limited. (228421) Regd. Feb. 29, 1928. To take over the bus. cd. on at 82, Upper Hanover Street, Sheffield, as "The County Creameries." Nom. Cap.: £1,000 in £1 shares (500 pref. and 500 ord.).

Alexandra Dairies, Limited. (228396) Regd. Feb. 28, 1928. 76, Mytton Street, Hulme, Manchester. To take over the bus. of the South Manchester Pure Milk Supply. Nom. Cap.: £10,000 in 5,000 ord. shares of £1 and 10,000 defd. shares of 10 -.

A. Simmill, Limited. (228365) Regd. Feb. 27, 1928. To take over the bus. of a wholesale and retail grocer and provn. dlr. cd. on at 77 and 79, High Street, Longton, Stoke-on-Trent. Nom. Cap.: £2,000 in £1 shares.

W. Bullough (Confectioners), Limited. (228358) Regd. Feb. 25, 1928. 21, Mawdsley Street, Bolton. To take over the bus. of bakers, confectioners, etc., cd. on at Bolton as "W. Bullough." Nom. Cap.: £8,000 in £1 shares.

F. B. Gandon 1928, Limited. (228312) Regd. Feb. 24, 1928. 43, Beech Street, Barbican, E.C. To carry on the bus. of butchers, fishmongers, provn. dlrs. etc. Nom. Cap.: £500 in £1 shares.

Direct Meat Supply (Salisbury), Limited. (228306) Regd. Feb. 24, 1928. To carry on the bus. indicated by the title. Nom. Cap.: £1,000 in £1 shares.

Gurneys, Limited. (228313) Regd. Feb. 24, 1928. 12, High Town, Hereford. To take over the bus. cd. on at Hereford and Brighton; and to carry on the bus. of grocers, wine, spirit, and liquor mchts., etc. Nom. Cap.: £100,000 in £1 shares.

C. W. Tooley and Son, Limited. (228645) Regd. Mar. 8, 1928. To take over the bus. cd. on at Sneinton Market, Nottingham, by Charles William Tooley, wholesale fruit dlr. Nom. Cap.: £3,000 in £1 shares.

Lawrence Hotel, Restaurant and Café Company, Limited. (228656) Regd. Mar. 8, 1928. 37, Market Place, Ripon. To carry on the bus. indicated by the title. Nom. Cap.: £1,000 in £1 shares.

Louis Rogers, Limited. (228655) Regd. Mar. 8, 1928. 21, King's Road, Reading. To take over the bus. of a provn. mcht., etc., cd. on as "Louis Rogers." Nom. Cap.: £15,000 in £1 shares.

West Midlands Milk Bottlers' Association, Limited. (228670) Regd. Mar. 8, 1928. Newton Place, Handsworth, Birmingham. To carry on the bus. indicated by the title.

G. Ray and Sons, Limited. (228620) Regd. Mar. 7, 1928. To take over the bus. of wholesale beer bottlers and mineral water mnfrs. now cd. on at Gt. King Street, Macclesfield, as "G. Ray and Sons." Nom. Cap.: £3,000 in £1 shares.

Ernest Parris, Limited. (228595) Regd. Mar. 6, 1928. 120, High Street, Sevenoaks, Kent. To take over the bus. of a baker, confectioner, and restaurant propr. hitherto cd. on at Sevenoaks.

Robert Watson and Sons (Wakefield), Limited. (228580) Regd. Mar. 5, 1928. To take over the bus. of a wholesale grocer and provn. mcht. cd. on at 19, Cheapside, Wakefield, as "Robert Watson and Sons." Nom. Cap.: £12,000 in £1 shares.

Cosmo (Lowestoft), Limited. (228502) Regd. Mar. 2, 1928. To take over the bus. of confectioners, hotel keepers, etc., now cd. on at 9, 10, and 11, Wellington Road, Lowestoft, as "The Cosmo (Hotel and Café)." Nom. Cap.: £500 in £1 shares.

Sterling Gelatine Company, Limited. (228488) Regd. Mar. 1, 1928. To carry on the bus. indicated by the title. Nom. Cap.: £2,000 in £1 shares.

F. J. Warren, Limited. (227964) Regd. Feb. 10, 1928. 55, St. John's Square, Clerkenwell Road, E.C.1. To take over the bus. of a wholesale and export fancy stationer and confectioners' sundriesman cd. on at St John's Square, E.C. Nom. Cap.: £7,500 in £1 shares.

Devon Boy Confectionery Company, Limited. (228017) Regd. Feb. 13, 1928. 60, Atlas Street, Middlesbrough. To carry on the bus. indicated by the title. Nom. Cap.: £1,000 in £1 shares.

Seaton Sluice Supply Stores, Limited. (228068) Regd. Feb. 14, 1928. Beresford Road, Seaton Sluice, Northumberland. To enter into an agreement with the liquidator of the Collywell Bay Supply Stores, Ltd., and to carry on the bus. of grocers and provn. mchts., etc. Nom. Cap.: £200 in £1 shares.

(*Continued on previous page.*)

Current Literature

Papers presented at the Convention of the National Canners' Association during the last week in January, 1928, and published in the "Convention Digest" of the "Canning Age" and in "The Canner."

The "Fresh" Foods: A New Problem of the Canning Industry.—A. D. Radebaugh.

How Delay in Canning Peas causes the Quality to Deteriorate.—P. L. Gowen.

How far can the Industry Legally go in Curtailing Production?—J. H. Covington.

What the Canner needs to know about Distribution.—C. L. Alsberg.

Why the No. 3 Can is Economically Unsound.—J. Moore.

Cull Tomatoes: How they add to Packing Costs.—F. C. Gaylord.

Hand-to-Mouth Buying as it applies to the Canning Industry.—L. S. Lyon.

A New Bacterium is found to Plague the Pea Packer.—E. J. Cameron.

"Wastes in Distribution": A Problem needing Solution.—F. M. Surface.

Research Findings on Corrosion and Vitamin Destruction.—E. F. Kohman.

Why the No. 3 Size Can should be Eliminated for Kraut.—T. W. Morgan.

Packing Quality into Red Sour Cherries.—H. C. Shau.

The Canner must follow through to the Consumer.—H. C. Faulkner.

Take your "Q" from Quality.—H. W. Phelps.

The Consumption of Canned Foods: A Survey of Public Opinion.—R. S. Hollingshead.

Grading Sweet Corn Seed for Size.—C. B. Sayre.

Market Conditions: Why place the Blame on Them?—G. H. Bradt.

A Quick Method of Detecting Spoilage in the Pack.—R. J. Thompson.

The Food Broker: His Rights and Obligations.—H. L. Cannon.

The Human Stomach and the Canning Industry.—R. McIntyre.

Heat Penetration and its Application to Canning.—W. D. Bigelow.

Incubating Canned Tomatoes to Test their Sterility.—R. J. Thompson.

Fruit and Vegetable Products

Vitamins in Canned Foods. VI.: Strawberries. E. F. Kohman, W. H. Eddy, and N. Halliday. (*Ind. and Eng. Chem.*, February, 1928, 202.)

Tomato Improvement in California: Development of Ideal Canning Tomato. J. T. Rosa. (*Canner*, 1928, No. 11, 18.)

The Chemistry of Jam and Jelly Making. W. A. Rooker. (*Fruit Prods. Jour.*, February, 1928, 18.)

Various

Biological Values of Certain Types of Sea Food. II.—Vitamins in Oysters. D. B. Jones, J. C. Murphy, and E. M. Nelson. (*Ind. and Eng. Chem.*, February, 1928, 205.)

Viscous Fermentation of Mineral Waters. R. Guyot. (*J. Pharm. Chim.*, 1927, [viii.], 7, 69.)

The Relative Content of the Fat-Soluble Vitamins A and D in a Series of Cod-Liver Oils. J. L. Clare and K. M. Soames. (*Lancet*, 1928, 214, 150.)

The Size of Flour Particles. W. P. Ford. (*Arkady Review*, April, 1928, 34.)

Importance of Particle Size in Manufacture of Flour and Baking. G. Van Der Lee. (*Chem. Weekblad*, 1928, 25, 34.)

Testing the Behaviour of Steam-Jacketted Copper Kettles. L. V. Burton. (*Canning Age*, March, 1928, 295.)

Method of Humanising Cow's or Goat's Milk. O. Ferrier and V. Chenard. (*J. Pharm. Chim.*, 1927 [viii.], 6, 562.)

Bromocresol Green as Indicator in the Manufacture of Grain-Curd Casein. A. G. Benton. (*Ind. Eng. Chem.*, 1928, 20, 15.)

Necessity for the Evaluation of Mustard Flour. Lebrum. (*J. Pharm. Chim.*, 1927 [viii.], 6, 109.)

Destruction of Essence of Mustard Oil in its Preparations. E. Lasausse. (*J. Pharm. Chim.*, 1927 [viii.], 6, 97.)

Analysis

Report of the Preservatives Determination Committee of the Chemists of the Manufacturing Confectioners' Alliance and of the Food Manufacturers' Federation: Determination of Sulphur Dioxide. (*Analyst*, March, 1928, 118.)

Notes on the Effect of other Reducing Substances on the Determination of Sulphur Dioxide. J. W. Black and B. J. Warren. (*Analyst*, March, 1928, 130.)

Rapid Determination of Sulphites by Alkaline Liberation or Extraction and Titration. H. R. Jensen. (*Analyst*, March, 1928, 133.)

Barium Sulphate Losses in Gravimetric Determination. H. R. Jensen. (*Analyst*, March, 1928, 136.)

The Determination of Sulphur Dioxide in Sausages and the Determination of Sulphur Dioxide in Foods by Distillation in a Vacuum. H. Osman Jones. (*Analyst*, March, 1928, 138.)

Note on the Oxidation of Sulphites by Air. H. M. Mason and G. Walsh. (*Analyst*, March, 1928, 142.)

Note on the Titration of Dilute Sulphite Solutions with Standard Iodine Solutions. H. M. Mason and G. Walsh. (*Analyst*, March, 1928, 144.)

The Determination of Sulphur Dioxide in Fatty Substances. A. W. Knapp and R. J. Phillips. (*Analyst*, March, 1928, 149.)

Note on the Stability of Solutions of Potassium Metabisulphite. R. J. Phillips. (*Analyst*, March, 1928, 150.)

Report on a Comparison between the Colorimetric (Rosenheim, Drummond) and the Biological Method of Determining Vitamin A in Cod-Liver Oil. (*The Lancet*, January 21, 1928, No. 5447.)

Determination of Lactic Acid in Sugar Solutions Decomposed by Alkali. T. E. Friedemann. (*J. Biol. Chem.*, 1928, 76, 75.)

Detection of Virgin Olive Oils in Refined Olive Oils. Baud and Courtois. (*Ann. Chim. Anal.*, 1928, 10, 11.)

Examination of Cod-Liver Oil in Wood's Light. H. Marcelet. (*Compt. Rend.*, 1928, 186, 226.)

Titre of New Zealand Mutton Tallows. A. M. Wright and I. Thompson. (*J. Soc. Chem. Ind.*, 1928, 47, 18T.)

Acid Values of Fats and Oils. A New Method of Determining the Barium Values of Fats and Oils. W. L. Davies (*J. Soc. Chem. Ind.*, 1928, 47, 24T.)

Detection and Determination of Waxes Mixed with Fats in Foods. N. Charliers. (*Chim. et Ind.*, Special No. 699, May, 1927.)

Determination of Starch in Marzipan Substitute. A. Gronover and A. Blechschmidt. (*Zeit. Unters. Lebensm.*, 1927, 53, 250.)

The Mucilaginous Cell Content of Cacao Shells. C. Griebel and A. Miermeister. (*Zeit. Unters. Lebensm.*, 1927, 53, 227.)

The Microscopy and Valuation of Cacao Products. H. Härdtl. (*Zeit. Unters. Lebensm.*, 1927, 53, 311.)

Abstracts of Papers Read before the Society of Public Analysts on Wednesday, March 7, 1928.

Composition of the Fatty Acids present as Glycerides in Elasmobranch Oils. By T. P. Hilditch, D.Sc., F.I.C., and A. Houlbrooke.

The method of separating the fatty acids of shark-liver oils by fractional distillation of the methyl esters has been experimentally examined, and identification tests applied to the redistilled fractions have established the validity of the method. The results are probably accurate to within about 1 per cent., up to and including acids of the C_{20} series. It is shown that whereas normal marine animal oils contain 30 to 40 per cent. of acids of the C_{20} and C_{22} groups, the fatty acids of shark-liver oils are of relatively low unsaturation. Apparently there is some connection between the deficiency of the above-mentioned highly unsaturated acids and the presence of large amounts of the highly unsaturated squalene.

Cacao Tannin. By H. R. Jensen, M.Sc., F.I.C.

As tannin is probably a principal cause of astringency in chocolate, the cinchonine method has been applied to the determination of tannin in cacao. The cinchonine tannate precipitate was found to contain 4·4 per cent. of nitrogen, which is similar to the 4·3 per cent. found in the hop and tea tannin compounds. The water-soluble tannin content of eleven samples of fully roasted cacao nibs ranged from 5·2 to 6·3 per cent.

Recent Patents

These particulars of New Patents of interest to readers have been selected from the "Official Journal of Patents," and are published by permission of the Controller of H.M. Stationery Office.

Latest Patent Applications

6770. A. E. BAWTREE: Appliance for softening butter. March 5.

7072. C. W. CAMPBELL: Machine for moulding and lidding meat pies, etc. March 7.

7038. A. K. EPSTEIN: Egg product. March 6.

7351. G. O. SANBORN: Packing baked fruits, etc. March 9.

6353. BAKER PERKINS, LTD.: Treatment of dough. February 29.

Specifications Published

277,363. G. FROVA: Machines for removing stones, cores, and stalks from fruit.

265,978. W. A. NOTENBOOM, A. W. NOTENBOOM, C. P. NOTENBOOM, AND K. P. NOTENBOOM: Device for sorting fruits or vegetables.

271,067. W. LOEBEN: Method of producing sectional chocolate bodies.

285,739. PEEK, FREAN AND CO., LTD., AND L. RONDOLIN: Machines for applying cream and like materials to biscuits and the like.

285,230. T. R. NEUTELINGS: Apparatus for cutting and moulding dough and like plastic materials.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at the uniform price of 1s. each.

Abstracts Published

284,130. **Preserving food.** W. K. GUNTHER, Kalvsund, Sweden.

Fish and animal foodstuffs are preserved by packing in water-damped sphagnum. The water may be cooled and may have salt added prior to moistening the sphagnum, which is only partly saturated therewith. A thin web of textile material may be placed between the foodstuff and the moss.

283,969. **Yeast.** AKTIESELSKABET DANSK GAERINGS INDUSTRI, 12, Snaregade, Copenhagen.

Yeast; wort, producing.—In the manufacture of yeast and spirits particularly from molasses, substances which do not contain SO_4-ions or other inorganic sulphur components are employed for acidifying the wort and as yeast nutrients, these conditions obtaining throughout the process, and resulting in spent washes free from noxious products. When molasses have been purified by treatment with substances containing SO_4-ions, the sulphates must be precipitated and filtered. The hydrogen ion concentration of the wort is obtained by adding hydrochloric acid, and as nutrients, ammonium chloride, ammonium carbonate, ammonium phosphate, etc., are employed.

283,879. **Beverages.** HOFBRAUHAUS WOLTERS UND BALHORN AKT.-GES., Brunswick, Germany.

Mashing-processes.—A process for producing special beers such as have the properties of beers brewed in Pilsen, consists in using the condensate of steam from brewing operations, with its contained heat if desired, for mashing and sparging the special beers. The condensate is drawn from the mash tuns and boiling coppers and is mixed with deep-well water until it is brought to a hardness of about 2°.

283,827. **Moulding dough.** R. MALE, Impasse Berthollet, Arcueil, Seine, France.

Rolling-machines.—In dough-moulding machines of the type involving a conveyer band pressed against a moulding-roller, the band is pressed against the roller by a deformable cylinder composed of a plurality of thin elastic metal rings arranged eccentrically around a second roller. Dough from a hopper is pressed into moulds of the roller by a drum and the dough portions are detached by a conveyer passing around a cylinder composed of thin metal rings which are rendered resilient by holes and inner saw cuts. The cylinder is eccentrically disposed about a roller, and is pressed against the roller by other rollers influenced by springs.

283,828. **Egg-beaters.** W. J. GOUNDRY, Swinburne, Barrasford, Northumberland.

An egg-beater rotated by a screw or rolling-strick comprises a sheet metal member having three arms, each with two perforations through which a continuous thread is passed.

283,970. **Yeast.** AKTIESELSKABET DANSK GAERINGS INDUSTRI, 12, Snaregade, Copenhagen.

Bacteria, cultivating; wort, special treatment of; purifying saccharine liquids.—Molasses for the production of yeast and spirit are treated with betaine-decomposing bacteria propagated on betaine or betain-hydrochloride, which process may be combined with the usual production of lactic acid by bacteria. Subsequent chemical treatment consists in adding an alkaloid-precipitating agent such as tannic acid and then removing the colouring substances by adding aluminium compounds such as aluminium sulphate and caustic soda, the sulphates and carbonates being precipitated by an added barium compound. Silicates of soda and potash may be employed for removing excess barium or aluminium ions. Barium aluminate may be used in place of the separate compounds. Depending upon the molasses employed, some or all of the chemical steps may be omitted and the chemical process, without pretreatment of the molasses by bacteria, may be utilised.

283,580. **Fruit food preparations.** CALIFORNIA FRUIT GROWERS' EXCHANGE, Los Angeles, U.S.A.

Fruit preparations are made by dissolving a colloid, such as pectin, agar, gelatine, etc., in the juice, adding, if desired, lactose or other sweeting or flavouring substances and then drying as by a spray drier. The juice may be that of the lemon, orange, etc., or mixtures thereof, and the product may be in powder, granular, flaky, capsule, or tablet form.

283,581. **Fruit and milk food preparations; beverages.** CALIFORNIA FRUIT GROWERS' EXCHANGE, Los Angeles, U.S.A.

Fruit and milk preparations are made by intimately mixing fruit juice and milk, preferably with homogenisation, and then drying the mass as by a spray drier. The juice may be that of the citrus fruit, lemon, orange, or grape fruit or mixtures thereof, and any suitable milk, whole or skimmed, may be used. The product may be in powder or flake form and is readily soluble in water to produce a beverage.

Recent Trade Marks

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal," and is published by permission of the Controller of H.M. Stationery Office.

GOLDEN EAST

486,225. **Dates.** SELIM, HOMSY AND COMPANY, 37, St. Mary Axe, London, E.C.3. March 14.

CAVALIER

486,312. **Chocolates and sugar confectionery.** G. F. LOVELL AND COMPANY, LIMITED, The "Mon" Confectionery Works, Albany Street, Grindau, Newport, Monmouthshire. March 14.

RONDENO

487,213. **Margarine and edible fats.** A. J. MILLS AND COMPANY, LIMITED, Colonial House, Tooley Street, London, S.E.1. March 7.

RONDINO

487,214. **Margarine and edible fats.** A. J. MILLS AND COMPANY, LIMITED, Colonial House, Tooley Street, London, S.E.1. March 7.

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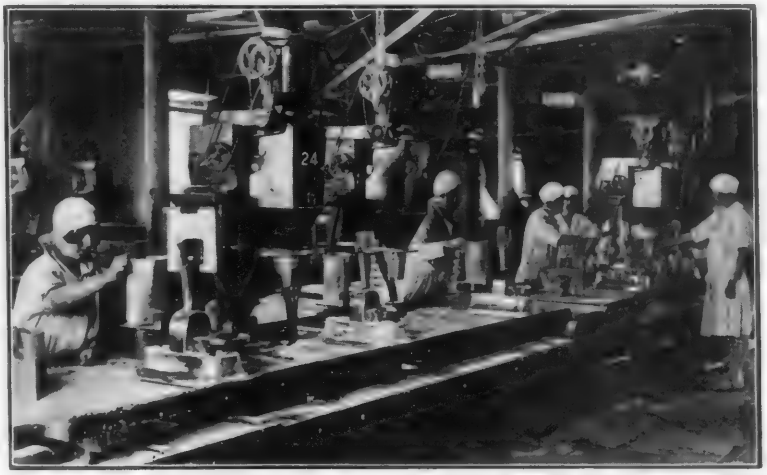

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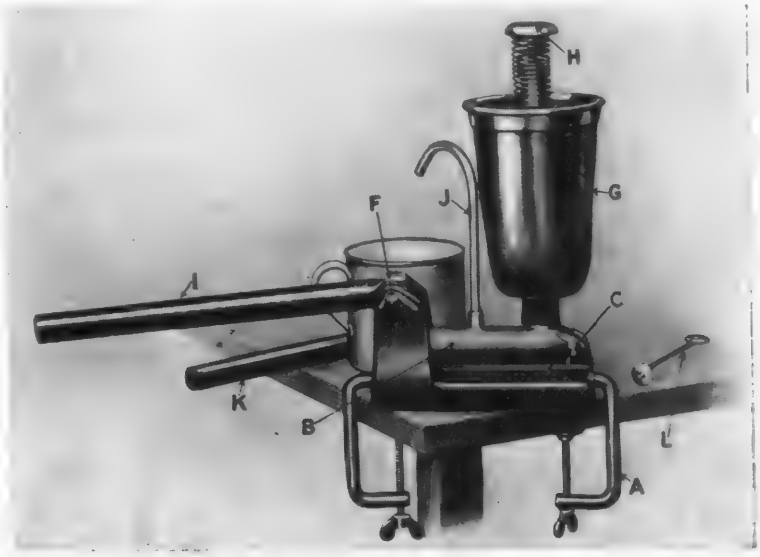
The HURCOL Hand Emulsifier & Cream Maker



A really Efficient Hand-operated Machine making one pint of Rich Cream in two minutes from Fresh Butter, etc.

SIMPLE. ROBUST.
SELF-CLEANING
REASONABLE PRICE

OUR CREAM MAKING AND MILK REGENERATING PLANT

is the most compact and efficient on the market—complete with Motor; Heating, Pasteurising and Mixing Vessel; Emulsifier and Cooler.

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Specialists in Chocolate-Cocoa-Confectionery Machinery

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THE
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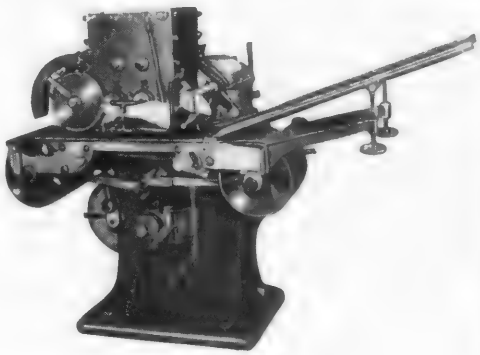
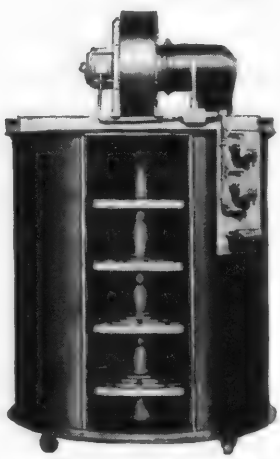
(Patented throughout the world)
for
Neapolitans,
bars and tablets of plain, nut and raisin CHOCOLATE of any consistency.





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"BAKER-WRIGHT" TIN LABEL DRYER

Is made in two sizes.
With six shelves will take flat half-size biscuit tins.
With four shelves will take full-size biscuit tins.

Electrically heated.

The dryer is portable.

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18-in. Direct Electrically-driven Centrifugal Machine for Separating Foreign Matter from Preserved Eggs (repeat order received)

An 18-in. size Centrifugal Machine runs at 1,500 Revs. per Minute, and has a Separating Effect 525 times greater than Gravity
Only a few minutes' treatment is necessary

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DRY SEPARATE or FILTER

many kinds of Materials, Substances and Emulsions, and are now being used for—

Extracting Fruit Juices from Pulp
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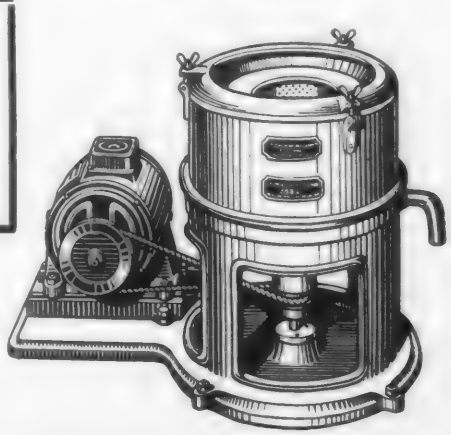
Why not instal a "BROADBENT" LABORATORY CENTRIFUGAL, illustrated here, and experiment with your products. It is a 9-in. electrically driven 2,400 r.p.m. model, and may show you how you can SAVE HUNDREDS of POUNDS a year with a commercial size machine.
Write for catalogue and full particulars.



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COMBINED ICE-MAKING AND COLD STORAGE PLANT

REFRIGERATION

For all Users, including

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FISHMONGERS,
DAIRIES,
CONFECTIONERS,
ICE CREAM,
ICE MAKING, etc.

MAXIMUM EFFICIENCY

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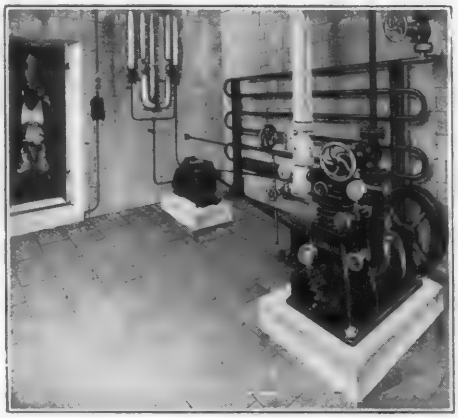
MINIMUM COST



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SILENT WHEN WORKING

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ENGINEERING
CO., LTD.

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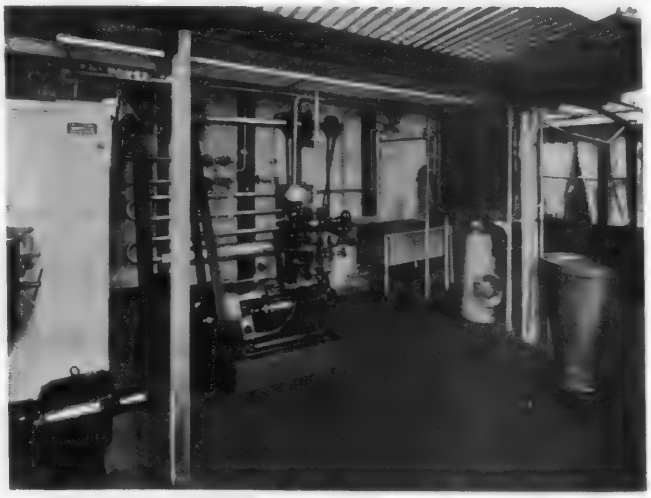
LONDON, S.E. 15

TELEPHONE : NEW CROSS 3002/3003



DAIRY PLANT : CAPACITY, 100 GALLONS OF MILK PER HOUR

Does the Weather affect your Business?

HAVE you ever considered what an important part Air Conditioning, that is, uniform condition of temperature and humidity, plays in the manufacture of almost everything ?

You have doubtless noticed that your products come through better on certain days, hot, cool, dry or humid, depending upon the weather.

Why not have the ideal condition *every* day.

It can be done—with Manufactured Weather.

We have designed and installed Carrier Air Conditioning Equipment for one hundred and fifty different industries; and if your problem does not come within our present experience we will test it out in our laboratory and advise you accordingly.

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We accept full responsibility by offering a rigid guarantee to maintain constant conditions of temperature and humidity irrespective of the outside weather.

Temperature and Humidity regulation under Automatic Control.

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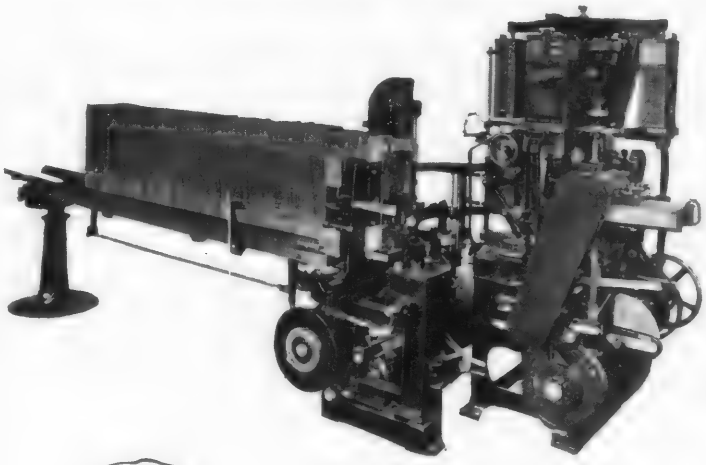
Individual effort or team work



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Pneumatic Scale Corporation Ltd.

Representatives:
F. C. Drinkwater; H. Dale-Glossop

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LONDON

Telephone: REGENT 0511

THIS illustration shows our automatic carton feeder and bottom sealer working in harness. This is the first link in a chain of fully automatic operations, the carton passing successively through the lining and weighing machines to the top sealer, and finally, if desired, to a Tight Wrapping machine. These machines can work independently of each other, and any of the set may be eliminated if desired. They can be used for printed cartons or for unprinted skillets "tight wrapped" with a printed wrapper.

CONCENTRATED ESSENCES . . . .

Fruit flavours specially prepared for every application in the Confectionery Trade.

ESSENTIAL OILS

Selected with great care and guaranteed pure.

HARMLESS COLOURINGS

of high concentration, conforming to the requirements of all existing Regulations.

When requiring any of the above, please ask us for samples and prices.

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REGISTERED TRADE MARK
GUARANTEES QUALITY

for the use of

AERATED WATER MANUFACTURERS, CONFECTIONERS, CHOCOLATE MANUFACTURERS, BISCUIT MAKERS, THE ICE CREAM INDUSTRY, LIQUEUR AND CORDIAL MANUFACTURERS, FRUIT SYRUP MAKERS, BRITISH WINE MAKERS, TABLE JELLY MANUFACTURERS

STEVENSON & HOWELL LTD.

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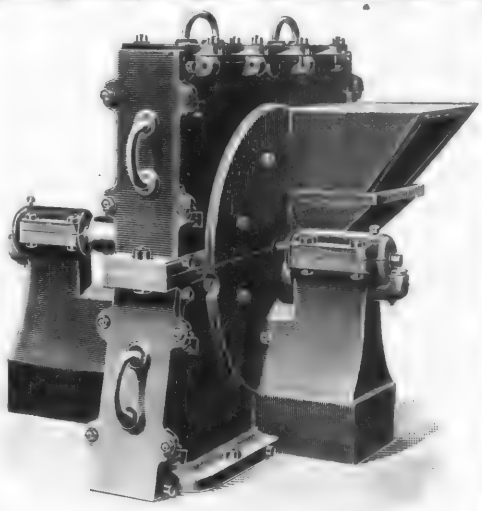
Members of the Food Manufacturers' Federation

CARTER'S

four - screen disintegrators for grinding Sugar

etc.

Specialists in the Grinding and Mixing of all kinds of Materials essential to Food Manufacture



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Milling Engineers

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London Office:
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THE MOVEMENT TOWARDS

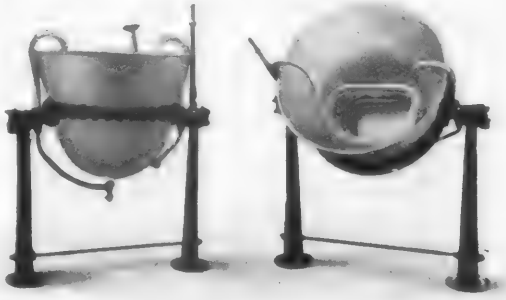
PURER FOOD

A Food Producing Kitchen entirely equipped with Aluminium Steam Jacketed Pans.

Jam and Food Bogie Wagon.

Jam and Food Carrying-off Pan.

¶ *Let us send an expert to talk over your problem, without obligation.*



"A.P.V." Preserve Making Steam Jacketed Pans (Quick Boiling). Supplied in various designs; with and without coils.

ALUMINIUM IS CLEANEST SAFEST AND MOST ECONOMICAL

ALUMINIUM PLANT & VESSEL CO., LTD.

NORTHFIELD HOUSE, WANDSWORTH, S.W. 18

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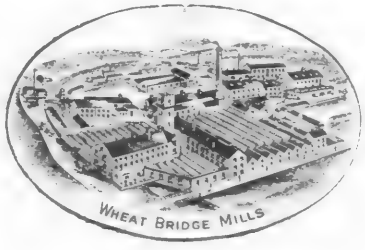
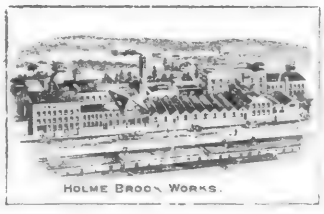


Round Boxes

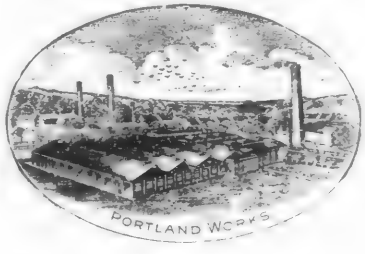
Our Round Box Factory is well equipped for the manufacture of a varied assortment of Round Boxes.

Our speciality, however, is a box with beaded ends. These boxes can be supplied with metal lids, metal dredgers or cardboard ends. Send for samples.



Rigid Square Boxes

We have been manufacturing this class of box now for close on a century, and our accumulated experience is at your disposal. Advice in your packing troubles and samples entirely free. Let us help you.



Cartons

We have recently extended this branch of our business, and our plant is one of the most up to date in the country. Food cartons are made from pure wood pulp and are guaranteed harmless. We are also well equipped for the manufacture of showcards.

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Bentleys

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Manufacturers of
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The Premier

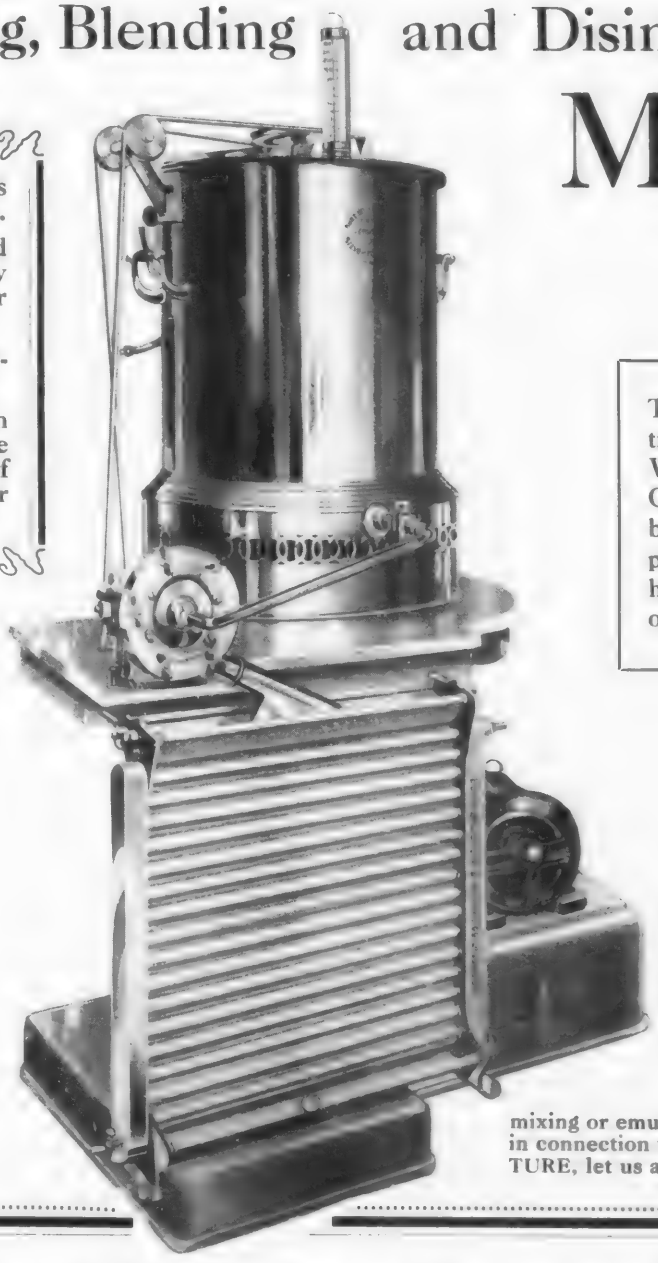
Emulsifying, Blending and Disintegrating Mill

In use in all Branches of Food Manufacture.

Perfect Blending and Emulsification of any material however difficult.

Flavour greatly improved.

Milk regenerated from Milk Powder can be made at the rate of sixty gallons per hour and upwards.



The machine illustrated makes Perfect Whipping DAIRY CREAM from fresh butter and milk powder at less than half the cost of ordinary cream.

Mills made for FOOD MANUFACTURE have all their working parts in Monel Metal or Solid Nickel.

Practically self-cleaning.

The PREMIER MILL, an entirely British Machine, is making headway rapidly because it is a money-making and a money-saving proposition.

If you have any problems in connection with the blending, mixing or emulsifying of any materials in connection with FOOD MANUFACTURE, let us advise you.

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Telephone: ALBERT DOCK 1511

One machine for many products

GARDNER'S

Quick Change Powder Dresser

(PATENT)

Saves time, saves space, saves labour, saves power, economises on plant expenditure, and proves a valuable ally to those who handle a varied range of products.

Parts are detachable and interchangeable for easy cleaning, and for changing quickly from one mesh to another.

The Dresser will successfully deal with practically any dry powders and will Sift these products through the finest possible mesh. The Material that will not pass through the meshes tail over at the special compartment at the end of the Machine which is clearly shown.

Automatic Feed is fitted when required and easily regulated.

For keeping the meshes clean or "open," Tappers are provided of a special design.

Spare Outer Barrels with clothing attached can be supplied with the machine.

The Barrel can be clothed in its length to produce two or more grades of siftings, if necessary.

For collecting the Siftings a Worm can be provided in the bottom of Machine, or in some cases Hoppers.

See the Quick Change working, or apply for full particulars to

GARDNER'S

WM. GARDNER & SONS (GLOUCESTER) LTD., ENGINEERS AND SPECIALISTS

BRISTOL ROAD · GLOUCESTER

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An order ?
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Has an obsolete type of packing held up a sale because of the bugbear of returns or a query on the question of carriage ?

If so—it's an argument !

Or is the salesman displaying his goods in an attractive corrugated packing—safe, strong and cheap—with a designed wrapper which is in itself an enticement to a customer ? A packing in which the question of returns and carriage does not arise ?

If so—IT'S AN ORDER !

Corrugated Paper in Rolls, Boxes, Pieces, Partitions, Cartons and Bottle Wrappers. Jam Crates a speciality. Send for samples and prices.

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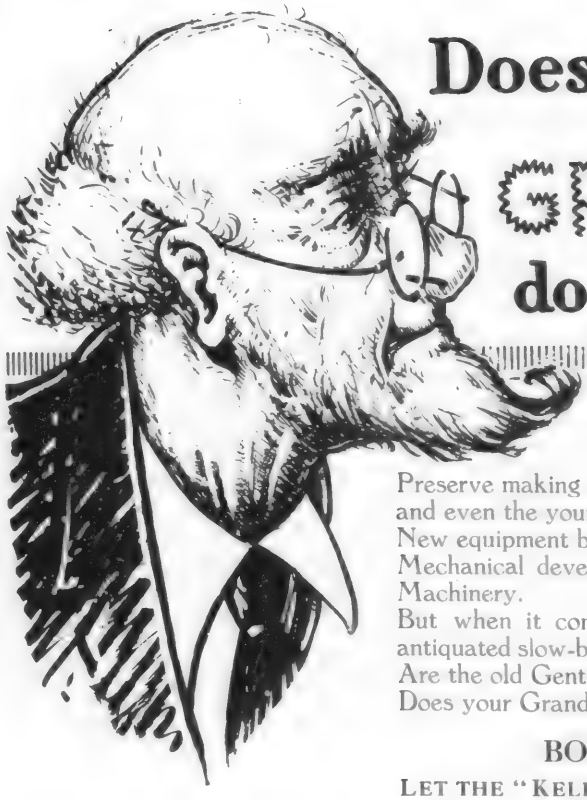

Does your GRANDFATHER do your Jam Boiling?

Preserve making is a modern industry. It is a young man's business, and even the young man has a hard time in keeping pace with it.
New equipment becomes obsolete over night.
Mechanical developments have been rapid in all sorts of Preparing Machinery.
But when it comes to the BOILING ROOM, are *you* using the antiquated slow-boiling Tilting Pans your grandfather might have used?
Are the old Gentleman's methods still guiding you?
Does your Grandfather still do your Jam Boiling?

BOIL IN THE MODERN WAY

LET THE "KELLIE" EXTRA-RAPID JAM BOILING PAN HELP YOU

Used in conjunction with our latest Automatic Pan Charging Plants the output per Boiling Pan will easily reach 4 tons per day of 9 hours.

BETTER COLOUR: BETTER FLAVOUR: LOWER COSTS

With one girl operator only to charge a battery of Five E.R. Boiling Pans, the human element reduced to a minimum.

WRITE TO-DAY AND ASK OUR EXPERTS TO CALL AND EXPLAIN TO YOU THE MANY UNIQUE ADVANTAGES OF THE "KELLIE" EXTRA-RAPID JAM BOILING PANS

THE SIGN KELLIE OF EXCELLENCE

FOR MODERN METHODS AND EQUIPMENT

Telegraphic & Cable Address: "KELLIE, DUNDEE." CODE: ABC (5th Edition).

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Complete Plants for Fruit Juice, Sugar Syrup, and Invert Sugar Preparing, Extracting, Filtering, Storing, Distributing and Charging.

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"KELLIE" Extra Rapid Jam Boiling Pans are the fastest Boiling Pans on the Market. Auto Pan Charging Plants, Compressed Air Plants, Horizontal and Vertical Fruit Cutting Machines for Stone and Stoneless Fruits, Continuous Jar Washing Machines, etc.

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SOLE MAKERS OF THE KELLIE-YATES JUICE, SUGAR-SYRUP AND INVERT SUGAR PREPARING, EXTRACTING & FILTERING PLANTS

For all purposes where milk is needed use

ANCHOR MILK POWDER

World Supreme for Quality and Flavour

THE fact that many thousands of Food and Sweet Manufacturers throughout the world use "Anchor" Milk Powder constantly, serves to prove that for purity, cost, economy in use, and consistent high quality, it is the finest milk powder produced.

Made by an entirely spray process, not precondensed or roller, "Anchor" Milk Powder has none of the burnt, cooked taste which is so prevalent in milk powders of inferior quality.

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KEK

The Mill that does most at the lowest cost in the shortest time

SEND FOR NEW HANDBOOK "A"

THE extraordinarily gratifying results obtained by leading Confectionery and Food Products manufacturers with KEK Mills have led to a largely increased adoption of this well-known mill in the confectionery trade. In the manufacture of Icing Sugar, for instance, the results given by the KEK Mill have not been approached by any other type of mill.

¶ *A postcard will ensure a call from our representative.*

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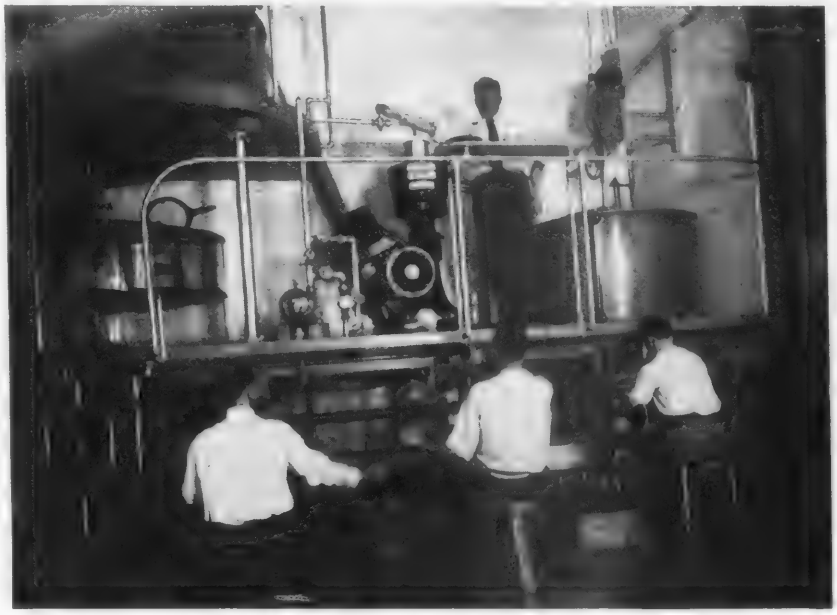
DE LAVAL
Separators
and
Clarifiers
are the Modern Method for the Purification of all Liquids



A De Laval Clarifier in use in a Food Factory.

In the handling of Vegetable Oils, Fish Oils, and many other Liquids, the use of settling tanks, filter presses, etc., is being rapidly superseded by the De Laval Centrifugal Method, which not only enables a large annual saving to be effected, but also improves the quality of the product.

Many firms are saving large sums by the employment of the De Laval Method, and those interested in the purification of any type of liquid should write for particulars.

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Telephone: VICTORIA 0800. **Telegrams: ALFALAVAL, SOWEST, LONDON.**

The WALLIS SAFETY MILK CAP

you're bound to adopt it sooner or later

WHY NOT NOW!

Approved by the Ministry of Health.

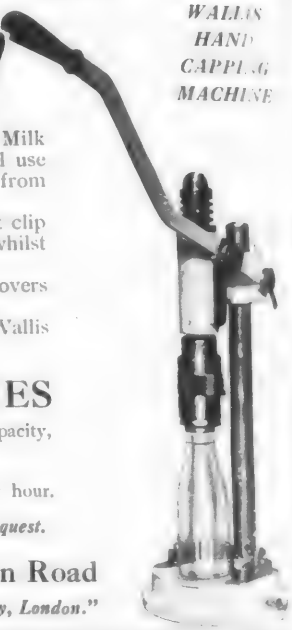
In addition to approval by the Ministry of Health the Wallis Safety Cap has been awarded the certificate of the Institute of Hygiene, also silver medals at the Dairy Show, 1926, and Royal Lancashire Show, 1927.

MOST of the leading bottlers of Grade A and Certified Milk use the Wallis Safety Cap. They have proved in actual use that it is the only satisfactory cap guaranteeing safety from manipulation in transit, and pollution by rain or dust.

The Wallis Safety Cap can only be used once. The patent clip destroys the cap on removal. Cap serves as dust cover only whilst in use.

Fitted by machine (hand or treadle) the Wallis Safety Cap covers the whole of the mouth of the pouring lip.

May we send you samples and prices? You will find the Wallis Safety Cap the most economical in the long run.



WALLIS CAPPING MACHINES

Machine for fixing the Wallis Safety Cap by hand, as illustrated: capacity, 40 dozens per hour.
Power Machine: capacity, 150-180 dozens per hour.
Also "Rappicapper" Treadle Machine: capacity, 100 dozens per hour.

Full particulars of the Wallis Safety Capping Machine sent free on request.

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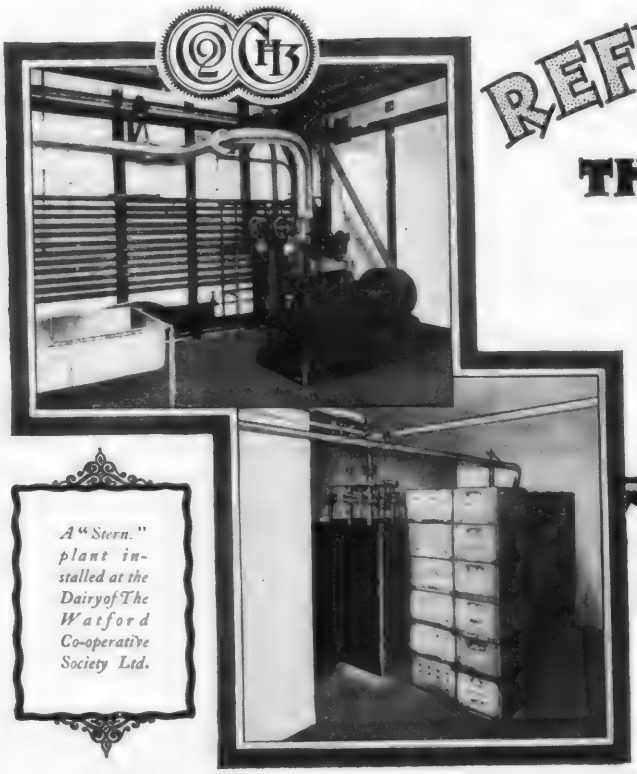
Telephone: North 2220-2221. *Telegrams: "Crocorkwal, Holway, London."*



A "Sterne" plant installed at the Dairy of The Watford Co-operative Society Ltd.

REFRIGERATION *and* THE FOOD INDUSTRY

Entirely British in construction, a "Sterne" Refrigerating Plant is compact, economical and trouble free. Consult us on your refrigeration problems; our experience is at your disposal.

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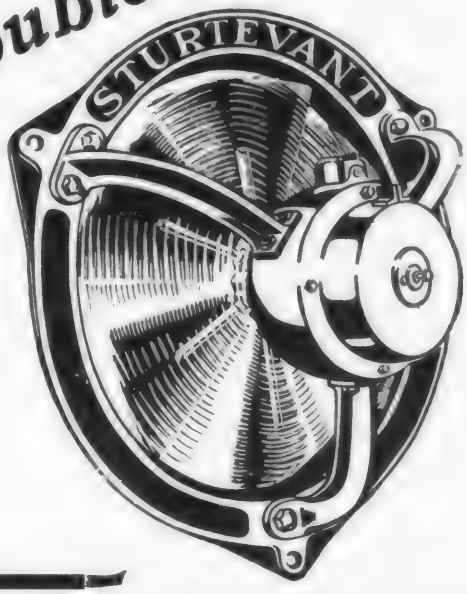
Are you troubled by steam ?



Steam-laden air causes considerable damage to buildings, necessitating expensive repair work ; moreover, it is very detrimental to the health of the workers, and thus seriously interferes with their efficiency.

Sturtevant propeller fans will keep a clear atmosphere in the factory, and exhaust the steam at a very low cost for power. They are extremely simple to operate, and cheap to install ; while they will soon pay for their first cost by reducing repair bills.

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BLISS SEMI-AUTOMATIC DOUBLE-SEAMING MACHINE

The can stands still during the operation of double seaming, and this machine will take care of round, oval, or rectangular cans up to 10 ins. in height, and $5\frac{5}{16}$ ins. across corners, or 6 ins. in diameter. Output from 800 to 1,200 ends per hour. All working parts enclosed but easily accessible. We will send a representative to your Works upon receipt of card.

E. W. BLISS CO.
4, POCOCK ST., LONDON, S.E.
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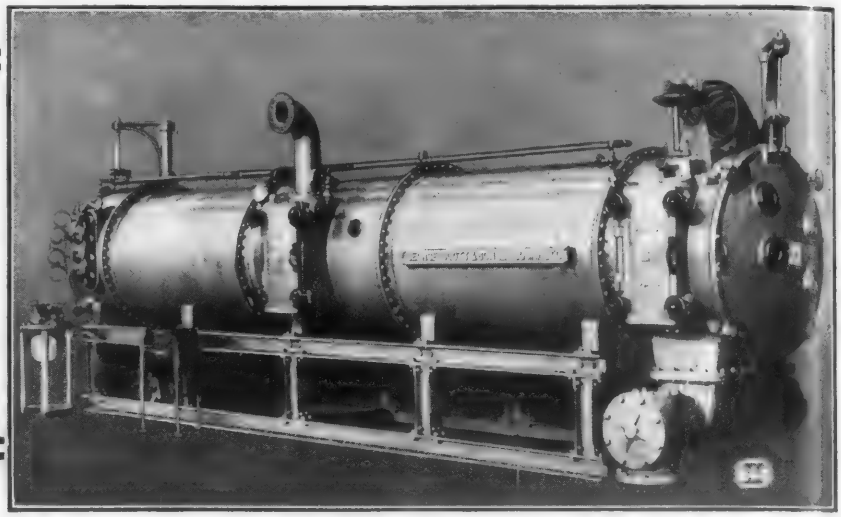
SCOTTS Vacuum Dryers

The illustration shows a Continuous Vacuum Band Dryer dealing with a delicate foodstuff and working under very high vacuum to conserve all the valuable properties of the original material.



This, and other SCOTT Vacuum Dryers, is ideal for materials requiring drying under low temperature conditions and liable to deteriorate in Atmospheric Dryers.

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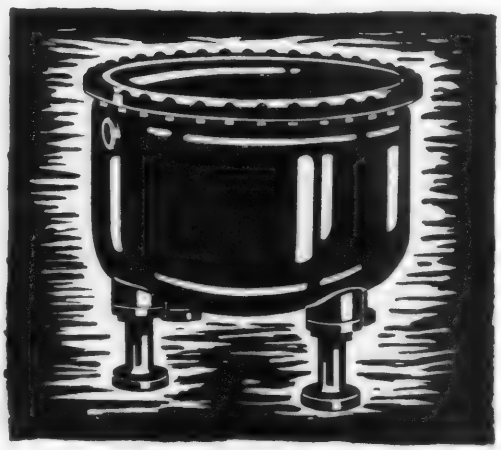
Also at 19, WATERLOO STREET, GLASGOW

Product purity guaranteed by Monel Metal!



Monel Metal guards against contamination and discoloration—insist on it being used in the making of your equipment.

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Full specialised literature gladly sent on request.

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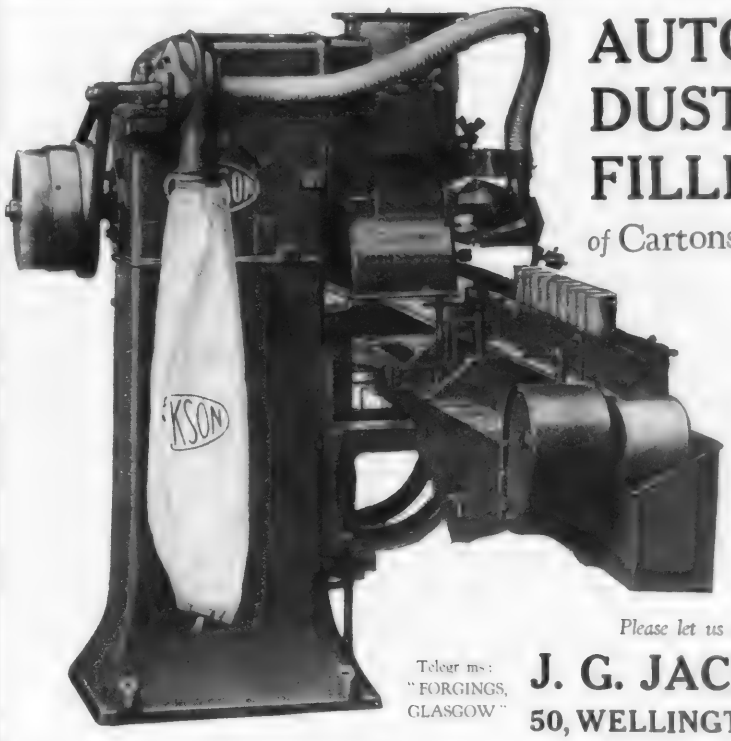
MONEL METAL DEPARTMENT
CATHCART——GLASGOW



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of Cartons, Tins, Canisters, Drums, etc.

THE packets when placed on the feed belt are automatically moved forward, filled, and ejected.

Other types of machines for meat pastes, plastic materials, pressure packing, carton sealing, tin lidding, grinding, sifting and mixing.

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Right
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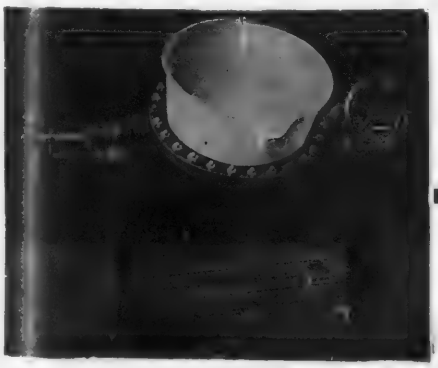

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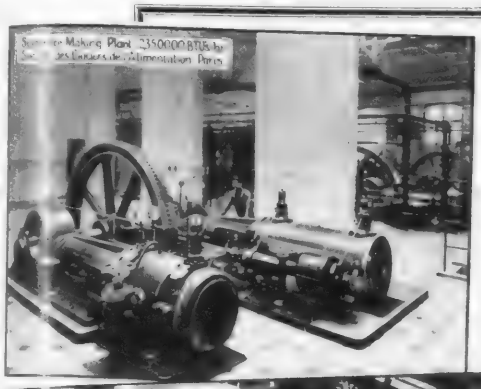

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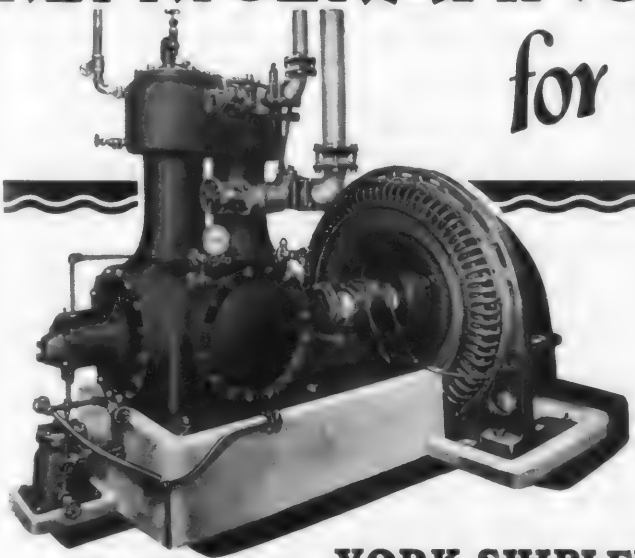

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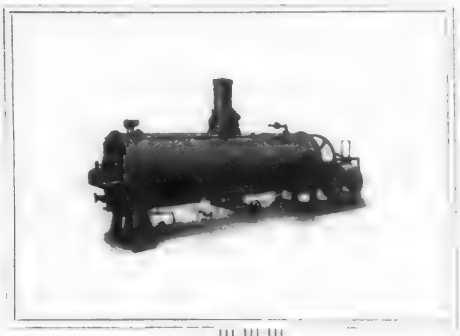

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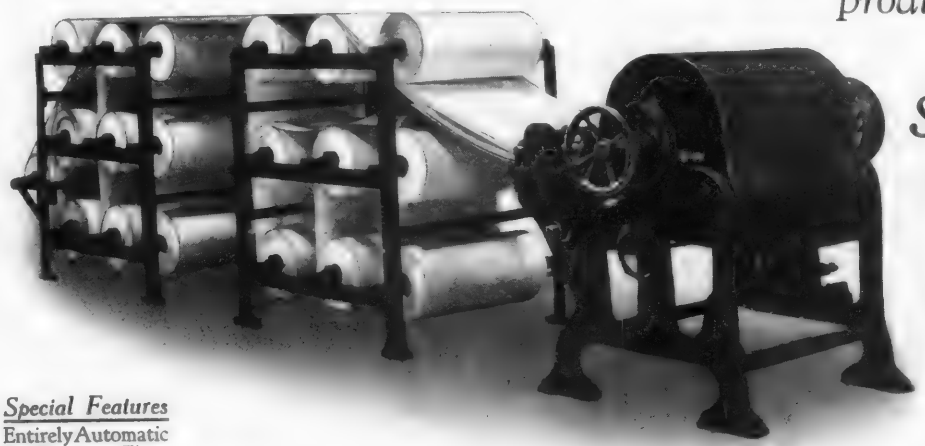

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The "Triumph" Rotary Machine cuts shavings in a wide variety of widths. Any paper may be used—tissues, parchments, and others. Every factory should save time and money and improve the packing by using the "Triumph." Fully guaranteed for one year. Over fifty at work daily in Bakeries, Confectionery, and other factories in U.K.

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MORE THAN ANY OTHER REQUIRES HIS MATERIALS PERFECTLY MIXED AND COOKED.

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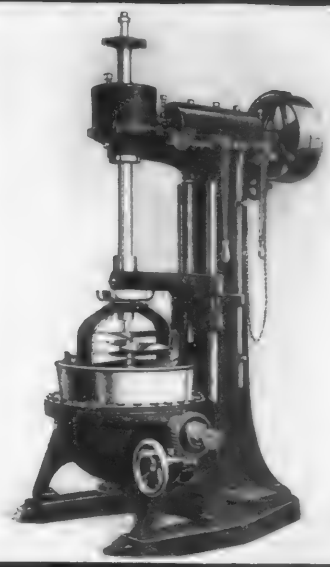

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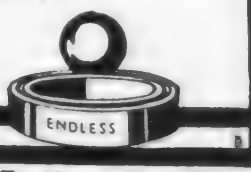

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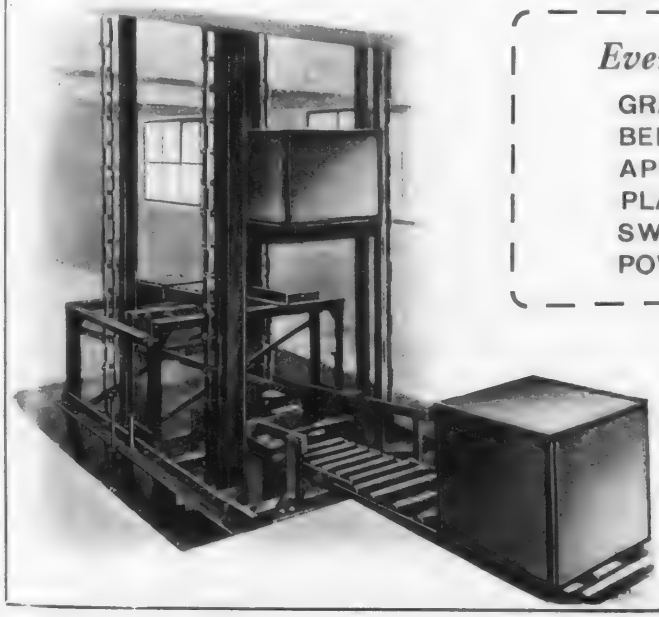

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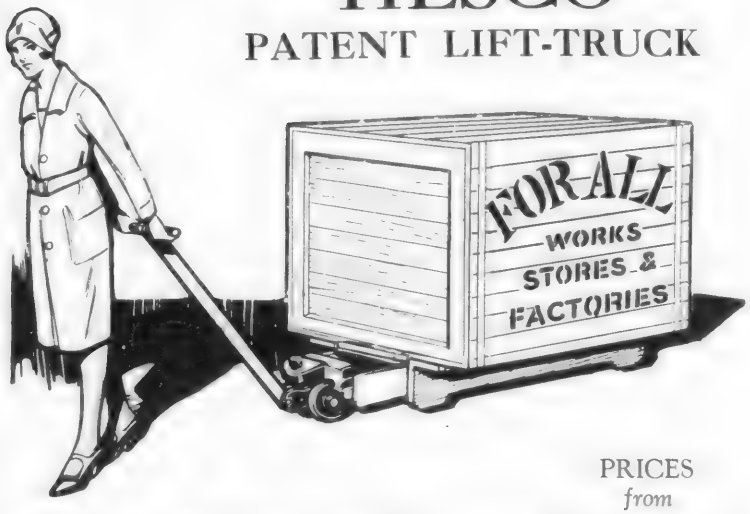

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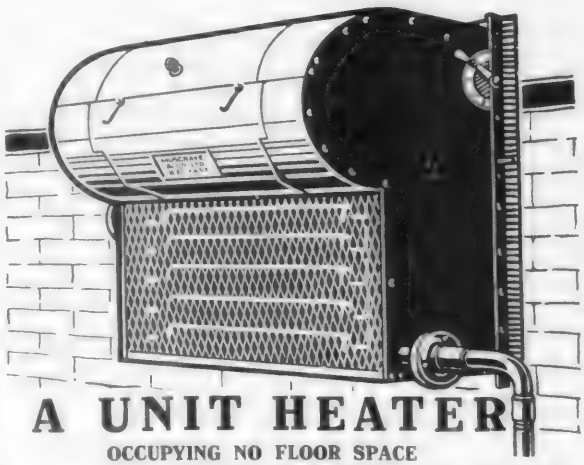

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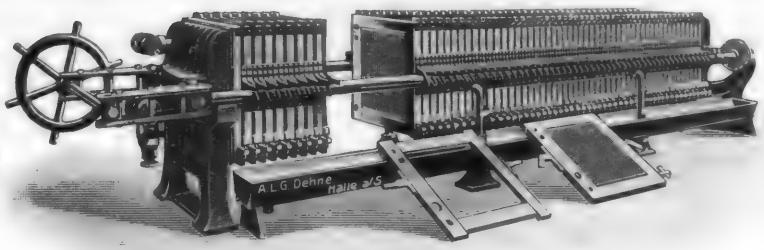

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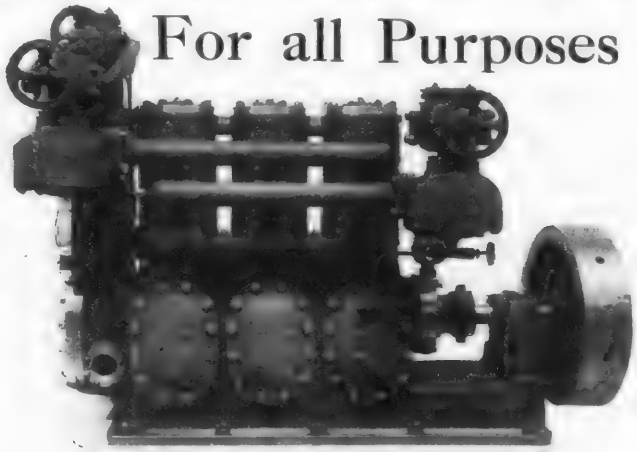

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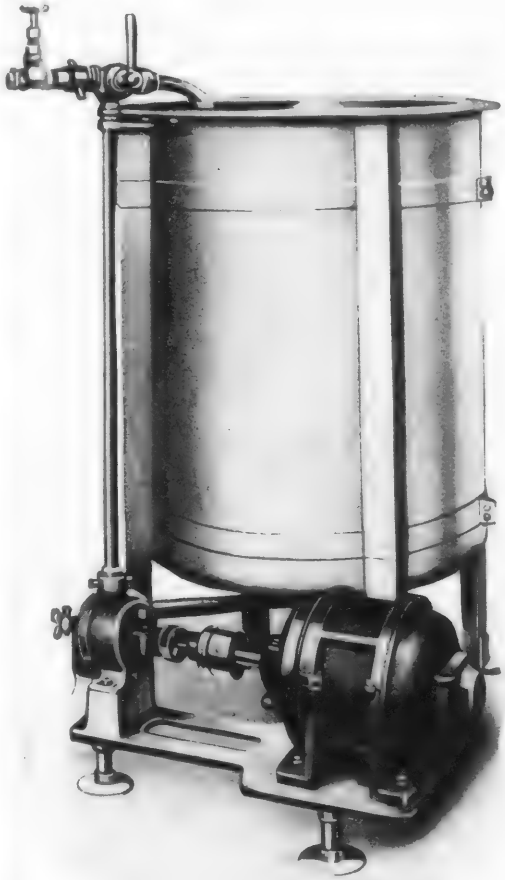
THIS IS THE "PFAUDLER" "SELF-CONTAINED" SYRUP MIXER AND FILTER



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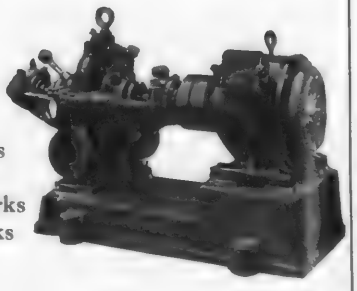

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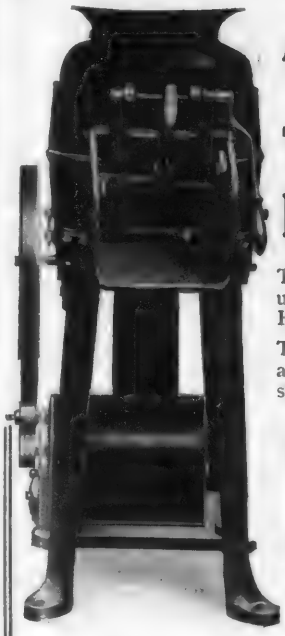

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The "Utility" Potato Peeler

These Peelers are in daily use in the principal Cafés, Hotels, Ships, etc.

They take only the outer skin and so save their cost in a short time.

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Mr. W. Leonard Hill
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175, Fleet Street,
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Dear Sir,

We are in receipt of your 1926 edition of the Chemical Engineering and Chemical Catalogue, and note considerable increase in the subjects over your last years publication. We consider that the information that this volume contains is of the greatest value to overseas manufacturers, and fills a long felt want by enabling us to get in touch with British Products, whereas hitherto American Porducts, which were widely advertised by similar means were often purchased. We would suggest that this Catalogue should be made better known in this Country by circularising manufacturers, a full list of whom can be obtained by reference to the various directories at Australia House, London.

Yours faithfully,
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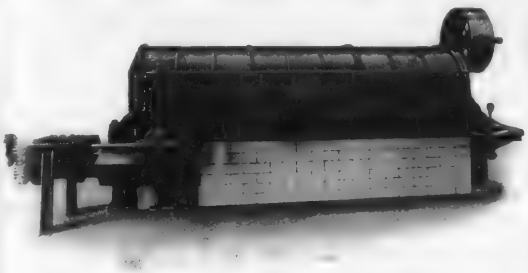

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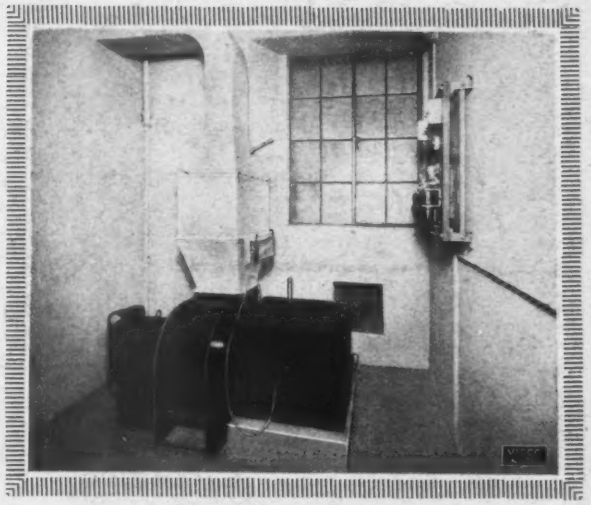

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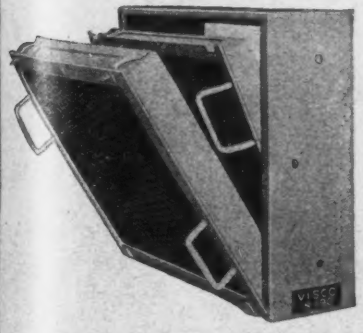

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